Economic Analysis of Labour Shortages:

the case of tool and die makers in Ontario

Ontario Economic Council

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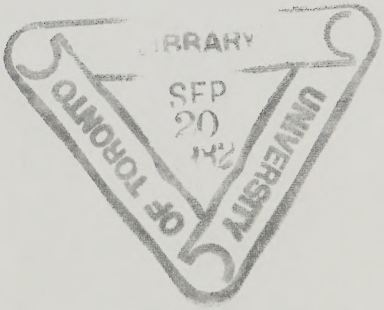

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In memory of my late sister
Toba Meltz Hausman

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1
Introduction

Skilled labourers are so essential to so many production processes that the well-being of the manufacturing sector may be said to depend on a sufficient supply of such workers. According to commonplace wisdom, this supply does not exist in Ontario or, indeed, in Canada. Dozens of recent newspaper articles have quoted manufacturers on the province's lack of the trained workers they require, and during the past few years several conferences, task forces, and surveys have focussed on Canada's need for skilled labour.[1]

The concern seems curious, perhaps even unwarranted. The same years have been a time of persistently high unemployment, and an unprecedented number of individuals are known to be seeking to enter apprenticeships. Yet we continue to hear about a need so great that it can be met only by recruiting trained workers overseas.

In the face of this paradox, one would expect a flurry of studies from economists attempting to determine if true labour shortages do exist now or have existed in the recent past. This has not occurred, at least not in published reports. Perhaps researchers have been deterred by the gaps in the occupational data collected and published in Canada.

The problems created by these gaps are real, but I believe they can be overcome sufficiently to permit useful study. As a prototype, I offer

1 Conferences have included the Ontario Manpower Secretariat's Skills for Jobs, 8-9 June 1978 (Ontario Manpower Secretariat 1978), and the Conference Board in Canada's Meeting Canada's Manpower Needs: Whose Responsibility?, 25 November 1980. Task forces have included the federal parliament's Task Force on Employment Opportunities for the '80s (Canada [1981a]), and Employment and Immigration Canada's Task Force on Labour Market Development (Canada 1981b). Surveys have included Betcherman (1980), MEMAC (1979), the Ontario Manpower Commission (1979), and one of my own, all of which are discussed in the following chapters.

this analysis of tool and die makers, a small but important subsector of skilled labour. (The choice of this occupation rested partially on its importance to the manufacturing process, partially on the fact that the press and manufacturers often cite it as a prime example of the skilled labour shortage they complain of.) It is by no means complete, but it does suggest an approach to analyzing possible labour shortages that uses the available data. Moreover, the analytical process itself points up the places in which we lack data.

In addition to developing an approach to the larger problem of analyzing the labour market in Canada, the objectives of this study are to determine whether there really is - or has been - a shortage of tool and die makers, to see how industry and labour have responded to any such shortage, and to consider what, if anything, remains to be done. The focus is on imperfections in the labour market for tool and die makers, with special emphasis on training and other means of adding to the labour pool. Chapter 2 draws a profile of tool and die makers in Ontario and describes the current apprenticeship program and other training arrangements. The subsequent chapters explore the market for tool and die makers. Chapter 3 examines evidence of shortages of tool and die makers in the 1970s; Chapter 4 uses the results of several surveys to consider the response of firms to a perceived shortage; Chapter 5 analyzes the reasons for what seems to be a recurring or cyclic shortage. Chapter 6 discusses market imperfections, and Chapter 7 proposes several government policies to mitigate them. Chapter 7 also suggests several ways to improve the recording and reporting of labour market data without a large increase in costs.

2

A profile of tool and die makers

To analyze the supply of tool and die makers and what has been or remains to be done to alleviate any shortage, one must first know the particulars of this specific labour force: what these workers do, what kinds of firms employ them, the composition of the present pool of workers, and - perhaps most important in a case of a suspected shortage - current inflows and outflows from that pool and present arrangements for adding to it. This chapter examines these points briefly; for convenience' sake, detailed statistics are grouped in Appendix A.

WHAT TOOL AND DIE MAKERS DO

In its Canadian Classification and Dictionary of Occupations (CCDO), the Department of Employment and Immigration defines tool and die making occupations (Code 8311) as those

> ... concerned with making and repairing custom-made, prototype or special tools, dies, jigs, fixtures and gauges that require working to close tolerances. Activities include: laying out, making mathematical computations, reading mechanical drawings, setting-up workpieces and machines, operating machine-tools, heat-treating parts, hand-fitting, and finishing work to specifications. (Canada 1971a, 1:524)[1]

Clearly, tool and die making requires a high degree of skill and considerable training. The CCDO assigns it a General Education Development (GED) Level of 4, indicating the need for approximately eleven to

1 The CCDO classification excludes not only 'occupations concerned with the mass production of tools' but also mould making. The Apprenticeship Branch of the Ontario Ministry of Colleges and Universities has, however, only recently revised its classifications to exclude mould makers from the tool and die category. Hence, some statistics in this study include mould makers.

twelve years of general education, and a Specific Vocational Preparation (SVP) Level of 7, indicating the need for two to four years of special training (Canada 1971a, 2:xv).[2]

NUMBER OF TOOL AND DIE MAKERS AND WHERE THEY WORK

Data on the number of persons employed in tool and die making - or in most other occupations - are not easy to come by in Canada. One can obtain or deduce monthly or quarterly statistics on unemployment and job vacancies,[3] but our knowledge of how many persons are actually working at a given trade is restricted to the occasional stop-motion pictures provided by the decennial censuses.[4]

Census data, do, however, give us a base for investigating the size of the tool and die market, its geographic distribution, and many of the characteristics of the persons working in the occupation. They show that in 1971 Canada had 10,310 tool and die makers, a number that had decreased slightly during the preceding decade (see Table A.1).[5] Nearly 80 per cent (8200) of them worked in Ontario; about half of these were located in Toronto or Windsor, with the rest spread through southern Ontario (see Table A.2). The concentration of the market is striking. Toronto, with 38.7 per cent of the province's tool and die makers, has more than three times as many as Windsor.

2 These GED and SVP levels are similar to those the CCDO assigns other highly skilled occupations, such as machinist, electrician, and millwright. In contrast, an occupation such as welder has a GED of 2 (seven to eight years of schools) and an SVP of 4 (three to six months of specific vocational training).

3 The uses of these data and the strengths and weaknesses of their sources are explored in the next chapter.

4 Statistics Canada's Occupational Employment Survey was designed to provide regular, detailed occupational data, but it has now been discontinued and its reliability is somewhat suspect (see Canada 1979a). Nevertheless, this study makes some use of its 1975 findings because they do provide information more recent than the last available census data. In general, they suggest that there was little change in the net number of tool and die makers employed between 1971 and 1975. On the lack of employment data in Canada, see Newton, Betcherman, and Meltz (1981) and Meltz (in press).

5 Previous census data suggest that the number of tool and die makers employed in Canada has undergone significant, long-term change only twice: a huge increase during the Second World War and a smaller jump during the immediate postwar period (see Table A.1).

This geographic concentration is related to the industrial sectors that use this kind of labour. Over 90 per cent of all tool and die makers are employed in manufacturing, most in four sectors: metal fabricating, transportation equipment, electrical products, and machinery (see Table A.1). The occupation's skills are generally transferable among these industries (and others that use tool and die makers, with the exception of the jewellery industry), so there is a general labour market for these workers. But it is so concentrated geographically that whatever happens to tool and die making in southern Ontario may be said to happen to the occupation generally. Moreover, it is important to note that tool and die makers are only a small proportion of the persons employed in these industries; the largest numbers are in metal fabricating, where they make up a mere 2.8 per cent of the labour force.

Perhaps because of these small percentages, tool and die makers have no union or association of their own. An estimated 35 to 50 per cent do, however, belong to unions, most to the United Automobile Workers or the United Steelworkers, some to the International Association of Machinists.[6]

The demand for tool and die makers is not, however, exclusive to large manufacturing firms. A current tendency in industry is to subcontract tool and die work to custom or speciality shops, which have become more numerous in recent years. These shops are small (say, under 200 employees) and tend to pay lower wage rates than the large manufacturers (Dufault 1976; Rees and Schultz 1970).

Thus, the labour market for tool and die makers may be considered to comprise two submarkets. The first consists of manufacturing firms that hire tool and die makers as a small percentage of a large number of employees, who are generally unionized. The other is much smaller specialty firms, whose employees are mostly tool and die makers; they are generally not unionized (Dufault 1976). As we shall see in later chapters, the two submarkets also differ in other characteristics, such as wage rates, willingness to take on apprentices, and behaviour regarding layoffs.

PERTINENT CHARACTERISTICS OF TOOL AND DIE MAKERS

Various other facts about tool and die makers may relate to the supply of

6 These estimates of union strength were given by officials of the three unions during personal interviews.

and demand for their labour.

First, as already noted, these workers must be highly trained. Such training is time-consuming - Ontario requires four years (8000 hours) of it, as detailed later in this chapter. It is also expensive - a 1976 study estimated that the training of one journeyman cost a firm $27,415 (Canadian Tooling Manufacturers' Association 1976), and this figure included neither government expenditures for providing required classroom studies nor the wages foregone by the individual while working at apprentice rates.

The second point, however, is that such training pays off: tool and die making is among the highest paid skills in the manufacturing sector. In 1979, for example, it commanded an average of $9.36 an hour in Toronto, 49 per cent above the average for general labour, and $9.91 in Windsor, 26 per cent above the general labour rate; other recent years have shown comparable differentials (see Table A.3). Moreover, these figures understate the annual earnings differentials since most tool and die makers put in a great deal of overtime at premium rates.[7] In 1979, one firm estimated that its tool and die makers were earning over $30,000 a year. Thus, an Ontario youth who selects tool and die making over general labour can expect to add at least $200,000 to his lifetime earnings (See Table A.4) and probably much more.

Third, a demand for tool and die makers does exist. The extent of this demand, as well as variations in it, is examined in the next chapter. It is sufficient to say here that the vacancy rate during the past decade has gone as high as 6.5 per cent of the total tool and die maker labour force, a figure significantly higher than the rates for other comparable occupations.

Given the occupation's high earnings and the existence of jobs, one would expect to find many young Canadians in it. But although evidence suggests that youths would like to enter this occupation, the number that have actually done so is limited, though it is growing. At the time of the 1971 census, 33 per cent of the tool and die makers in Canada were age 45 or over (see Table A.5), indicating an occupation that was not accepting a large number of young men.[8]

7 Annual earnings figures are available only from the decennial census, so this statement cannot be proved with recent data. However, it seems unarguable.

8 The occupation is overwhelmingly male - more than 98 per cent in 1975 (Canada (1975)).

Over half the tool and die makers counted by the same census had been born outside the country and most of these had entered Canada after 1951 (see Table A.6). In other words, during the 1960s, inflows to the occupation came more from immigrants than from Canadian-trained apprentices. During the late 1970s, apprenticeship registrations rose sharply in Ontario (see Table A.7), but throughout the decade, immigration continued to add more new workers to the tool and die labour pool than did domestic training (see Table A.8).

One must ask why a well-paid occupation in which there is supposed to be a labour shortage is not attracting greater numbers of young Canadians. In fact, it is attracting them, but it is not holding them. An estimated 500 persons registered with Canada Employment Centres (CECs) in October 1980 were seeking apprenticeships,[9] a demand that far exceeded the available positions. But since the mid-1970s, only 50 per cent of those entering tool and die making training have completed their apprenticeships, a high drop-out rate that will be considered in more detail later in this study.

APPRENTICESHIP IN ONTARIO

As of 7 March 1980, the Ministry of Colleges and Universities, Apprenticeship Branch, reported 1217 tool and die apprentices in Ontario,[10] the highest number ever recorded in the province (see Table A.7).

Levels of apprenticeship enrolment had begun to increase sharply in 1978. Since it was in July 1978 that the province established tool and die making as a certified trade, mandating the previously voluntary registration of apprentices, some of this rise may be illusory, reflecting only the inclusion of training that had previously gone on outside the system. For the most part, however, it seems to be a genuine increase, a contention supported by the high demand for apprenticeship places that is currently reported by CECs. One suspects that the demand was created

9 This estimate was derived by assuming that 75 per cent of the 652 unemployed persons then registered at CECs as seeking work in tool and die making were actually seeking apprentice positions. As we shall see in Chapter 3 the figure of 75 per cent is a very conservative one; 80 or 85 per cent would be closer to reality, according to a sample of CEC offices in Toronto.

10 This figure excludes 169 mould maker apprentices, who do not fall into the CCDO classification of tool and die makers.

by the publicity given to the need for tool and die makers in the late 1970s.

High apprentice registrations do not, however, necessarily create large numbers of journeymen. Although registrations rose during the 1970s, completion rates dropped to less than 50 per cent, in contrast to the first half of the 1960s, when they averaged 84 per cent (see Table A.7).[11]

Certainly a beginning apprentice faces a long training period at relatively low pay. Current provincial regulations (Ontario 1978) set his minimum wage rate as a proportion of the same employer's rate for journeymen (moving upward from 50 per cent during the first 1000 hours of training to 85 per cent during the eighth and last 1000 hours). They also fix the maximum number of apprentices a company may hire at one for every three journeymen it employs, plus one for the first journeyman in the firm. (Union contracts may stipulate a greater number of journeymen for each apprentice.)

The regulations also state that an apprenticeship program must consist of 8000 hours of related training and work experience training, divided into four periods of 2000 hours each (the assumption is that each period will take one year to complete). To be registered in the program, a person must obtain employment as an apprentice with a firm, which must register him with the ministry's apprenticeship branch. The program requires three periods of community-college schooling: an eight-week course of basic training, a seven-week course of intermediate training, and a seven-week course of advanced training.[12] After completion of the required hours of classroom and on-the-job-training, the apprentice must pass an examination based on the provincially set units of study.

Apprenticeship training is not the only means of learning tool and die making in Ontario. Some community colleges offer two- or three-year

11 It can, of course, be argued that sufficiently high apprentice registrations will yield enough tool and die journeymen, even with a low completion rate. After all, 50 per cent of 700 apprentices would be more than 80 per cent of 300. The loss to firms in training costs and to individuals in time and foregone wages is, however, considerable.

12 In calculating total hours of training, each week of schooling counts for the same number of hours the apprentice would normally have worked for his employer. For example, if the average work week with that employer is forty hours, then the three training periods count as 880 hours out of the required total of 8000.

programs in the trade; credit from them can be applied towards apprenticeship completion. (For example, George Brown and Fanshawe community colleges' courses for a 'toolmaking technician' provide 3400 credit hours; Algonquin's and St. Clair's, 3200 hours.) A student who follows one of these courses, however, still has to find an employer with whom he can apprentice to obtain the remaining hours of required training and still has to take the examinations. And as we shall see, the community college programs present would-be tool and die makers with various problems that make this training considerably less attractive than apprenticeship.

3

Were there shortages of tool and die makers in the 1970s?

Despite the widespread impression that Canada has a significant shortage of skilled labour in general and tool and die makers in particular, the economist needs specific evidence that such a shortage does actually exist. This chapter, therefore, examines data on job vacancies for tool and die makers, unemployment among these workers, and surveys of their employers' perceptions of hiring ease, along with statistics on starting and average wage rates and a consideration of how they fit a standard model of a labour shortage.

VACANCIES AND UNEMPLOYMENT

In the economic theory of labour markets, a shortage is defined as an excess demand for a particular type of labour at the going wage rate. Unfortunately, it is not easy to prove that a shortage exists in a Canadian labour market; various kinds of data are available, but no source is without problems and ambiguities.

One method of establishing the existence of a shortage is to show that the number of vacant positions for a particular occupation exceeds the number of qualified unemployed persons who are seeking work in it at the going wage rates. Data on vacancies are available from Statistics Canada's Job Vacancy Survey (JVS), which is now discontinued but ran through 1978, and from Canada Employment Centre (CEC) listings; figures on the unemployed can be assumed from CEC registrations or from the number of persons receiving Unemployment Insurance (UI) benefits. As we shall see, none of these sources is completely satisfactory - for example, most of them do not identify wage rates[1] - but they do offer a starting point for

1 The exception is the JVS, which did identify hiring wage rates. These are included in the analysis later in the chapter.

an analysis.

Calculations based on the JVS

The JVS showed that from 1971 to 1978 gross vacancies for tool and die makers fluctuated considerably, hitting highs of 6.5 per cent of estimated employment in the last quarter of 1972, 6.2 in the third quarter of 1973, and 5.7 per cent in the second quarter of 1978 (see Table A.9). These figures may not seem high, but the data from the same source show that the next highest peak for a skilled occupation was 3.0 per cent (for machinists). Motor vehicle mechanics, an occupation of the same skill level as tool and die making, had a vacancy rate of 2.5 per cent. Even lesser skilled, high-turnover occupations had lower vacancy rates; sewing machine operating, for example, peaked at 4.0 per cent in 1974.[2]

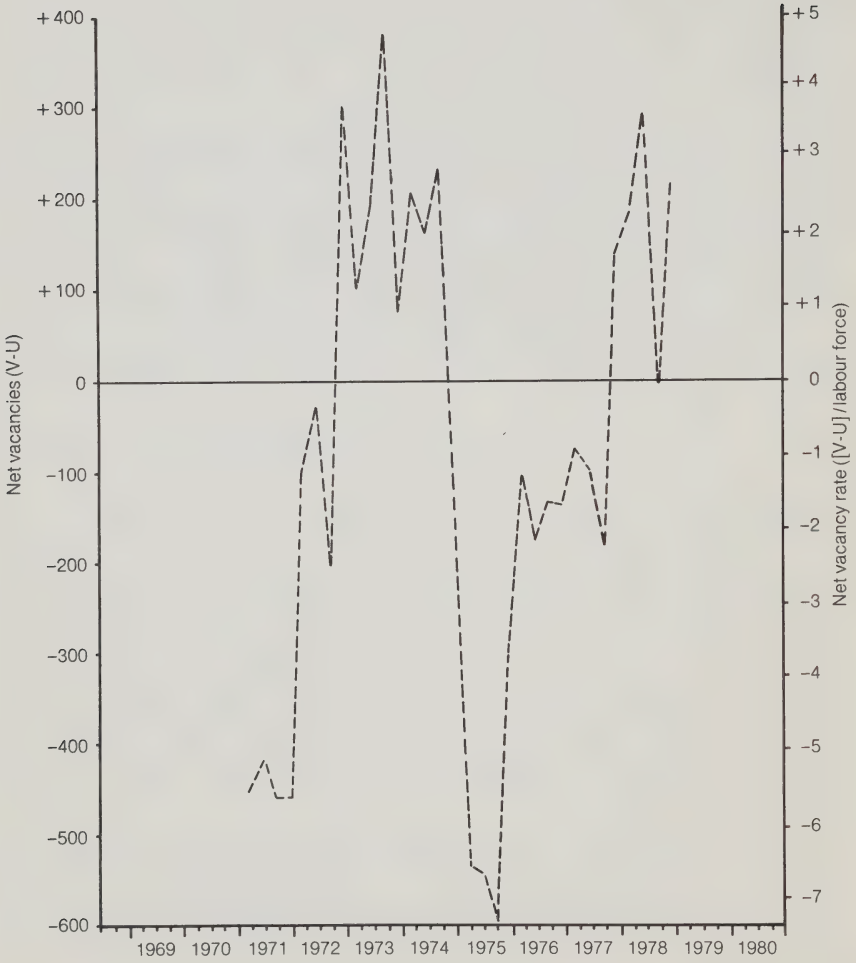
To obtain net vacancies, one can take the JVS figures and subtract from each the number of unemployed tool and die makers listed with CECs at that time (see Table A.13). (One could also use data on tool and die makers who were receiving Unemployment Insurance benefits. The effect of doing so is discussed later in this chapter. I chose to use CEC unemployment data for my calculations primarily because they provided the longest series available.)

Figure 1 shows the results of these calculations for 1971-8. Assuming for the moment that the vacancy and the unemployment data relate to the same market (that is, that the unemployed persons were qualified to fill the vacancies) and to the same wage rates, the picture is one of recurring shortfalls of labour followed by shorter periods of excess supply. And if one assumes that some of the job-seekers were not truly qualified - the probable situation, as we shall see later in this chapter - the extent of the shortfalls increases.

Is this sufficient proof of a true economic shortage of tool and die makers in 1973-4 and again in 1978-9? Why were the shortages preceeded and followed by substantial surpluses? The first question is discussed in this chapter, while the second is dealt with in Chapter 5. This chapter

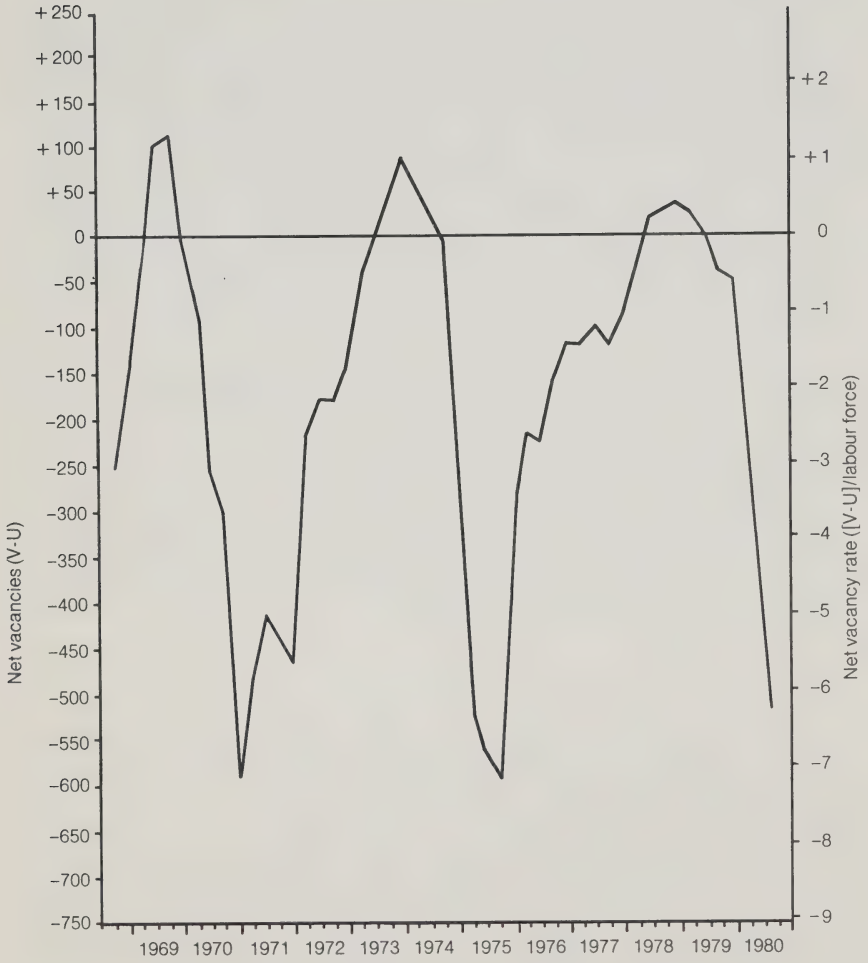
2 The various vacancy rates were calculated by dividing the number of full-time vacancies shown in the JVS (Statistics Canada 1977, Table 7B) by the number of persons employed in that occupation as shown in Statistics Canada's Occupational Distribution of Employment.

Figure 1
Net vacancies for tool and die makers (Ontario 1971-8) calculated with JVS vacancy data and CEC unemployment data.



Source: Table A.13.

Figure 2
Net vacancies for tool and die makers (Ontario, 1968-79) calculated with CEC vacancy and unemployment data



Source: Table A.12.

also provides a more detailed examination of the vacancy and unemployment data.

Calculations using CEC data

To check our first impression of the relation between vacancies for and unemployment among tool and die makers, let us recalculate net vacancies substituting CEC data for vacancies (see Table A.12). The results for 1968-79 are shown graphically in Figure 2. The longer series of vacancy data suggests three cycles of shortage and surplus between 1968 and 1979. The peaks in terms of shortage were the third quarter of 1969, the fourth quarter of 1973, and the fourth quarter of 1978, with troughs in terms of surplus in the fourth quarter of 1970 and the third quarter of 1975. The cycles are quite regular: four to five years from peak to peak.

According to the CEC data, the periods during which vacancies exceeded unemployed job-seekers were short and of much smaller magnitude than the periods of surplus. This is a somewhat different picture than that given by the JVS data, where the regular cycles show much larger and longer shortages relative to surplus.

Regardless of this discrepancy, the two sets of data are convincing evidence that shortages of tool and die makers have existed in recent years but that their extent has fluctuated over time, following a regular cycle of approximately four years' duration.

OTHER EVIDENCE: SURVEYS OF EMPLOYER REQUIREMENTS

The vacancy data are supported by three recent surveys of employer manpower requirements, which identified tool and die making as one of the leading shortage occupations. The Ontario Manpower Commission, which surveyed firms during July and August 1979, found a 26 per cent vacancy rate for tool and die makers, compared with an overall shortage of 22 per cent in various occupations for which employers reported hiring difficulties (1979, Table 2). The Machinery and Equipment Manufacturers' Association of Canada surveyed machinery and equipment manufacturing companies across Canada during the first quarter of 1979. The number of positions it found vacant was 20 per cent of the total number of tool and die makers employed in firms in Ontario; the comparable overall shortage it reported

was 13 per cent (MEMAC 1979, 12).

The third survey was conducted by the Economic Council of Canada during October 1979 with a follow-up to nonrespondents in early December of the same year. Unfortunately, it did not ask for present employment by detailed occupation, so it does not offer data from which specific vacancy rates can be calculated. It does indicate, however, that 50 per cent of Ontario firms were experiencing hiring difficulties and that machinery occupations, which include tool and die making, were among those that presented the most severe problems (Betcherman 1980, 4, 7).

In brief, all three surveys indicate that at the end of the 1970s many employers said they were having difficulties hiring skilled persons and that there were particular difficulties in the case of tool and die makers. Such reports cannot provide conclusive proof of a labour shortage, but they do confirm that tool and die makers were relatively unavailable in the late 1970s.

EVALUATING THE STATISTICS

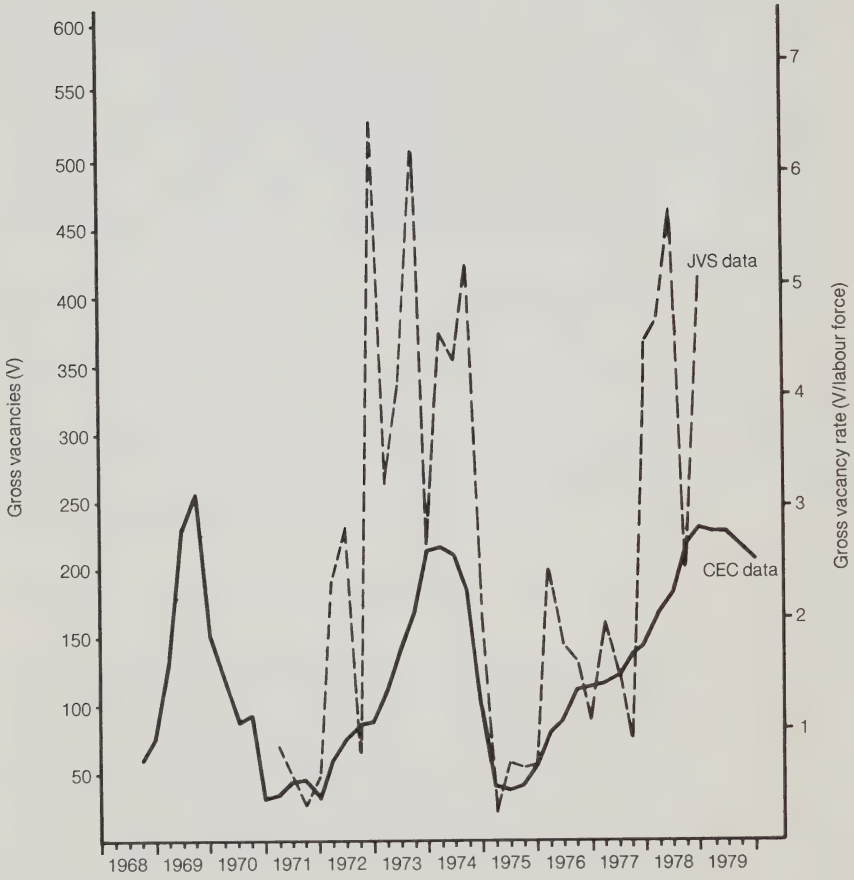
As we have seen, the statistics from various sources all suggest periods of recurrent shortage as measured by excess demand. Yet there are discrepancies, particularly in the extent of the shortages measured. It is worth examining the data in more detail both to find reasons for these discrepancies and to increase our certainty that shortages have occurred.

The data on vacancies

A comparison of the gross vacancy data from the JVS and the CEC is shown graphically in Figure 3. (Since the JVS data are quarterly figures while the CEC data are reported monthly, the CEC data have been averaged for each quarter to provide a basis for comparison.) Both series follow the same general pattern of regular upturns and downturns. There is also some similarity in the timing of peaks and troughs. The major difference is that the JVS peaks of 1973-4 and 1977-8 are two to three times as high as those of the CECs. By contrast, the two series almost coincide at their low points.

These differences are not surprising. One would expect that JVS figures to exceed those from the CECs for several reasons. The JVS

Figure 3
Gross vacancies for tool and die makers (Ontario, 1968-79): a comparison of JVS and CEC data



Source: Table A.9.

aimed at the entire universe of firms and it has been estimated that it did cover the employers of 90 per cent of the employed labour force in Canada.[3] The CECs' data, on the other hand, can include only those firms that place orders with them. Yet the CECs do not receive listings for all openings in all occupations, even from those firms that list some vacancies with them. For example, a firm that recruits for certain types of occupations through CECs may regularly use different hiring mechanisms, such as newspaper ads, private agencies, and contact through friends and relatives, for other occupations (see Maki 1972). Thus, the CEC data are likely to show a lower vacancy rate than actually exists. On the other hand, the CEC figures may also contain some overstatement of vacancies since orders sometimes continue to be listed as active after they have been filled or withdrawn. On balance, however, the CEC figures should be less than those of the JVS because of the latter's broader coverage of employers and occupations.

One should also expect the two sets of data to differ considerably more when demand is high than when it is low. When demand is high, some firms do not bother to list all of their vacancies with the CECs. In this situation, an employer may know that the centres have few listings of persons available for work, especially if they have already proved unable to fill earlier orders. Once again, the JVS data, which included all possible ways of looking for tool and die makers, were likely to include many more vacancies than the CEC listings.

The discrepancy between the data from the JVS and CECs on the one hand and the ad hoc employer surveys on other also deserves comment. The JVS indicated at most a vacancy/labour force rate of less than 7 per cent for tool and die makers, whereas two surveys produced rates of 20 and 26 per cent respectively. One source of the difference may be the samples of firms used. The JVS attempted to approximate the entire universe, whereas the Ontario Manpower Commission sample may have included a higher proportion of firms with hiring difficulties, thereby biasing the resulting vacancy rate upward.[4] The same implicit bias could

3 The excluded sectors were agriculture, domestic service, the military, and fishing and trapping.

4 The OMC survey-makers set out to look at hiring difficulties. Moreover, firms with difficulties may have been unusually willing to complete the forms, feeling that they might thus encourage government action on their 'problem'. The OMC survey results were based on

underlie the MEMAC survey.

A second source of difference may have rested in the wording of the questionnaires. The JVS defined a vacancy as a job that was (1) available immediately, (2) one for which employers had undertaken a specific recruiting action in the previous four weeks, (3) vacant for the entire reference day, and (4) available to persons outside the firm (Canada 1978). The ad hoc surveys were less restrictive, asking for data on the number of positions the firms were trying to fill (OMC) or the number in which there were hiring difficulties (MECAC and Betcherman).

Regardless of the measure used, however, there do appear to be a large number of vacancies for tool and die makers in comparison to overall vacancies.[5]

The data on unemployment

One can obtain data on unemployment among tool and die makers by counting either those receiving Unemployment Insurance (UI) benefits or those registered at CECs as unemployed job-seekers in the tool and die category (see Table A.10).[6] The two sets of data are compared graphically in Figure 4. It is worth noting that both sets reveal a cyclical pattern of unemployment among tool and die makers, one that occurs in reverse phase to the one we found for vacancies; the peaks were in 1971 and 1975, the years of low numbers of vacancies, and the troughs in 1969, 1973, and 1978, the years of high vacancies.

Nevertheless, the data are not identical. The CEC registrations

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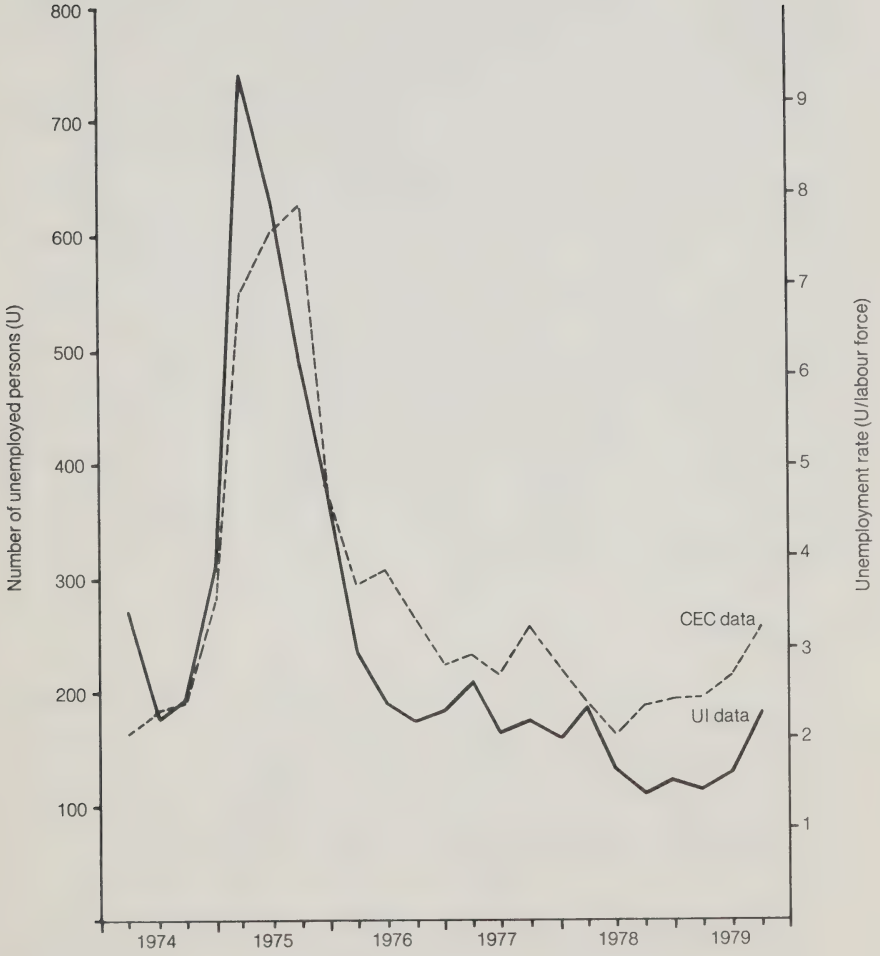
questionnaires mailed to 3083 employers who belonged to the Ontario Division of the Canadian Manufacturers' Assocation (CMA) and 2687 who belonged to the Canadian Federation of Independent Business (CFIB). Of the total of 5770 employers surveyed, 1153 responded (20.0 per cent). In contrast, the Betcherman survey received 1354 responses from 4012 establishments (33.7 per cent).

5 A separate analysis of the dispersion of wage rates on orders submitted to CECs would be useful. Any vacancies seriously below the market wage rates should be excluded from a determination of excess demand. One would hypothesize that ceterus paribus the higher the offered wage rate, the shorter the duration of the vacancy.

6 CEC data are also available on employed job seekers. These figures have not been included here on the assumption that these persons were already employed as tool and die makers.

Figure 4
Unemployment among tool and die makers (Ontario, 1968-80):
a comparison of CEC and UI data



Source: Table A.10.

averaged sixty more than the number of tool and die makers receiving benefits. The pheomenon is easily explained. More unemployed persons in any category tend to be registered with CECs than to be listed for UI because of the two-week waiting perod between losing a job and receiving UI benefits. In addition, persons who have newly entered or reentered the labour force may not be eligible for UI benefits because they have not worked the required number of qualifying weeks.

This difference between CEC and UI data is so standard that one must ask what happened in 1974-5, when the number of unemployed tool and die makers on UI generally equalled or exceeded the number of registered at CECs. The explanation for this aberration lies in a combination of two facts: there was a slump in the auto industry that year, and certain unions with hiring halls have an understanding with UI that their members do not have to be listed with a CEC to obtain UI benefits. Such an agreement exists with the United Automobile Workers, to which many tool and die makers working in the auto industry belong.[7]

Confirmation of high rates of unemployment among tool and die makers in 1971 and 1975 can be obtained from the census and from the Occupational Employment Survey (see Table A.11). These indicate unemployment rates of 6.5 and 6.7 per cent for the two years respectively, compared with 1.5 per cent in 1961, a year in which the overall unemployment rate was 7.1 per cent of the labour force.

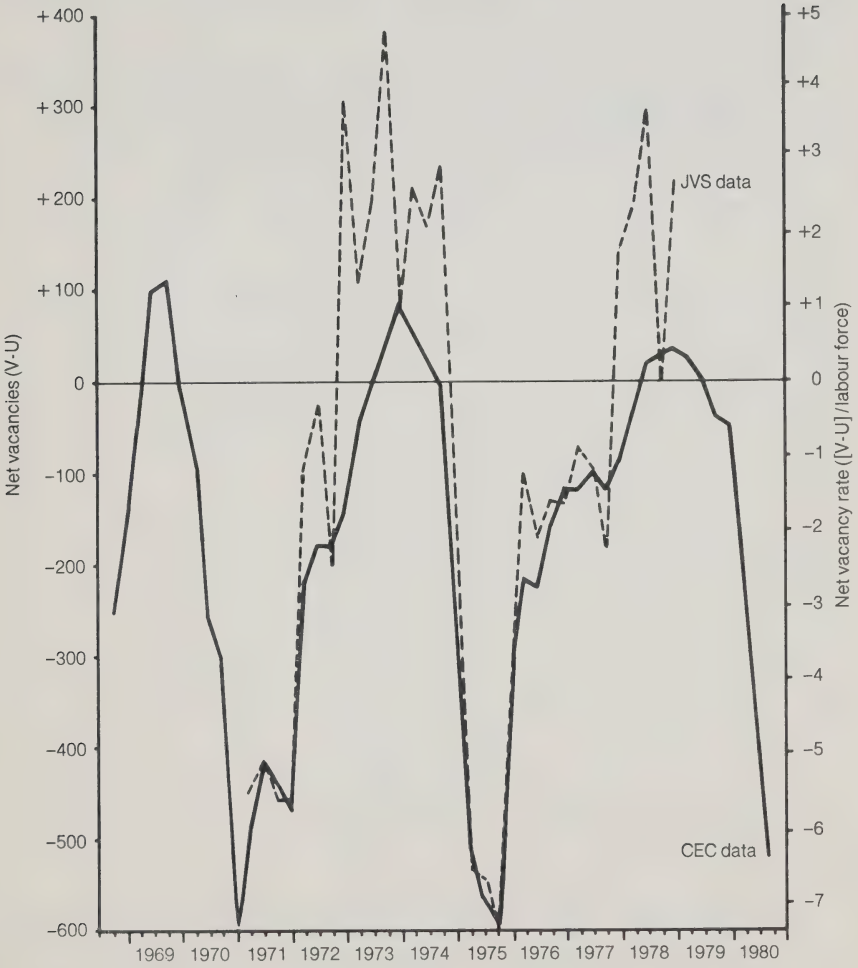
Net vacancies

When the CEC vacancy data are used to calculate the number of net vacancies (gross vacancies less unemployed persons, or [V - U]) the pattern that emerges is similar to the one obtained from JVS data.[8] Figure 5 compares the two patterns. The main differences are that the CEC data produces an excess of net vacancies that is much smaller and of shorter duration. It should be observed that the CEC data also show an

7 This explanation does not account for the first quarter of 1974, which preceded the downswing in the auto industry. Here the reason lies in administrative procedures. At that time UI and CEC maintained separate offices, and persons receiving UI benefits were not required to register at a CEC. Thus, the number of unemployed receiving benefits could exceed the number registered at CECs.

8 Both sets of calculations use CEC unemployment data.

Figure 5
Net vacancies for tool and die makers (Ontario, 1968-1980):
a comparison of calculations based on JVS and CEC vacancy data



Source: Tables A.12 and A.13.

earlier cycle, from 1968 to 1972, that was almost finished before the institution of the JVS.[9]

The cyclic patterns do not apply to all tool and die makers in Ontario but seem confined to certain localities. Figure 6 shows marked swings over time in the (V - U) relationship for Windsor and much small ones in Toronto and Hamilton.

Nevertheless, the overall picture is clear. All the data show high points of excess demand in 1969, 1973, and 1978 with low points of excess supply in 1971 and 1975. The latter part of 1980 witnessed a decrease in excess demand.

THE PROBLEM OF QUALIFICATION

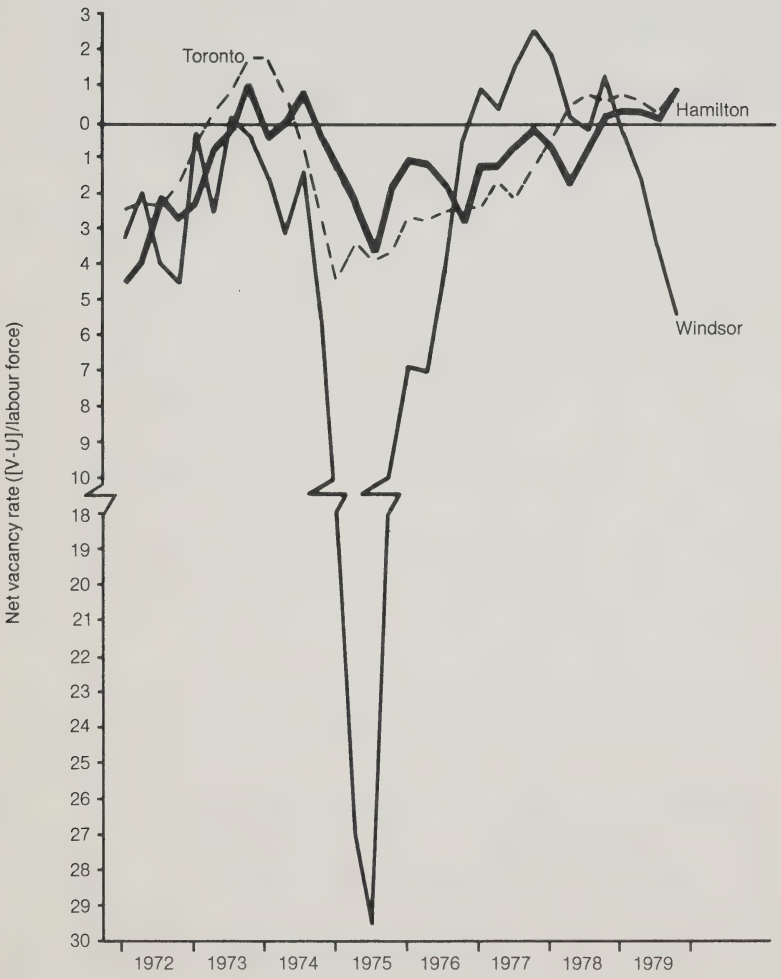
In determining whether or not there have been labour shortages in a given occupation, a key question is whether the job-seekers in that occupation were qualified to fill vacancies in it. The raw data themselves do not provide any indication of qualifications. Some indication can be gained, however, from examining the basis of occupational classification and from interviews with employment counsellors at CECs.

The basis for classifying individuals by occupation in Canada is the Canadian Classification and Dictionary of Occupations (Canada 1971a).[10] It provides the classification system used by the Canadian census, CECs, and most federal government statistics. Unfortunately for labour-market analysis, its classifications do not distinguish between fully qualified tradesmen (journeymen) and persons learning the trade (apprentices). To make matters worse, the CECs include in their files persons who have no experience or training in a field but would like to enter it as apprentices. The result is that both UI and CEC records tend to overstate the number of qualified persons available for work in a highly skilled occupation such as tool and die making.

9 The relationship between vacancies and job seekers was also examined in terms of the type of (V - U) relationship considered by Reid and Meltz (1979). The result was the expected inverse relationship but with vacancies and unemployed of similar magnitudes at the extremes. The data for all occupations, on the other hand, showed the unemployment rate as ten times greater than the vacancy rate.

10 For a discussion of the approach to occupational classification, see Meltz and Stager (1979).

Figure 6
Net vacancies for tool and die makers in selected cities
(Ontario, 1972-9)



Source: Tables A.2 and B.12.

Interviews with employment counsellors in several CEC offices in Toronto in the spring of 1980 suggested that only 15 to 20 per cent of the clients registered with them as seeking work in tool and die making (CCDO code 8311) had any experience in the trade. Most of the job-seekers were unemployed youths hoping to be accepted as apprentices. This fact makes a considerable difference to the picture given by the data. For example, if a generous estimate of 25 per cent is assumed to be the proportion of registered CEC clients who were qualified to fill listed tool and die vacancies in the second quarter of 1980, the net figure changes from an excess supply of 321 to an excess demand of 55.[11]

Since mid-1980, layoffs at automobile plants have undoubtedly increased the number of qualified tool and die makers who are unemployed. Many of these, however, are receiving Supplementary Unemployment Benefits (SUB) and are awaiting recall to jobs in the large auto plants, which are generally much higher paying than the majority of the positions presently listed as unfilled (see Chapter 4). As a result, the effective number of qualified job seekers has not increased substantially.

For earlier cycles in the labour market for tool and die makers, it is difficult even to estimate what proportion of job seekers were qualified. Since 1968, there certainly seem to have been recurrent true shortages, although their size is not known precisely. It can be said with a high degree of certainty, however, that an excess demand for tool and die makers existed during the late 1970s.

11 Using the CEC staff members' suggestion of a proportion of qualified registrants that was as low as 15 or 20 per cent would yield an excess demand of 106 or 81, respectively, for the second quarter of 1980.

Whether the precise figure is 15 or 25 per cent, the low proportion of qualified job-seekers complicates analysis even more than is immediately evident. Generally when data on vacancies and unemployment are combined, the result provides an indication of whether or not there has been a change in structural or frictional unemployment (Reid and Meltz 1979). In the case of tool and die makers in Ontario, a vacancy-unemployment diagram based on CEC data shows a slight rightward shift after 1976. On the surface, this shift seems to indicate an increase in structural or frictional unemployment at each vacancy level. Unfortunately, since so few of the unemployed persons represented in the data are trained tool and die makers, it is difficult to know whether structural unemployment actually increased or whether the greater numbers of unemployed per vacancy indicated only more persons wanting to train in tool and die making because they heard it was a good trade to prepare for.

WAGE RATES AND A LABOUR SHORTAGE

Another approach to determining the existence of a labour shortage involves examining changes in wage rates. Basic economic theory says that prices rise when the quantity demanded exceeds the quantity supplied. Figure 7 models an excess demand for labour in a perfectly competitive labour market. At the wage rate W_1, the quantity demanded, OE_1, exceeds the quantity supplied, OE_2. The expected response is an increase in wage rates that, in turn, leads to an increase in the quantity supplied and a simultaneous decrease in the quantity demanded. Both responses continue until a new equilibrium is reached at the wage rate W_2.

In other words, the existence of a labour shortage should be associated with an increase in wage rates. How well does what has happened in the market for tool and die makers match this traditional supply and demand theory? In attempting to answer this question, we will consider data on two types of relative wage rates[12]: hiring wage rates and average wage rates.

Hiring wage rates

In a perfectly competitive market, a labour shortage would trigger a rapid rise in hiring wage rates since these rates should be most responsive to difficulties in obtaining suitable persons. On the analogy of the Phillips curve, one expects a positive relation between changes in wages rates and the level of vacancies. In fact, this relation should have an increasing slope at higher levels of vacancies since as a shortage becomes more severe, wage rates - especially hiring wage rates - should go up more sharply.

Has this phenomenon occurred in the market for tool and die makers? The available data are limited to average annual figures on hiring rates from the JVS for the period 1971-7 (see Table A.14).[13]

12 Since overall wage rates have been rising throughout the last two decades, one would expect tool and die makers' wages to have risen absolutely, whether or not there have been true shortages during the period.

13 These data were only published for years in which vacancies exceeded 100 persons. Since the JVS data was reported on an annual basis, the vacancy data was converted to annual averages for Figure 8.

Figure 7
Supply and demand in a micro labour market

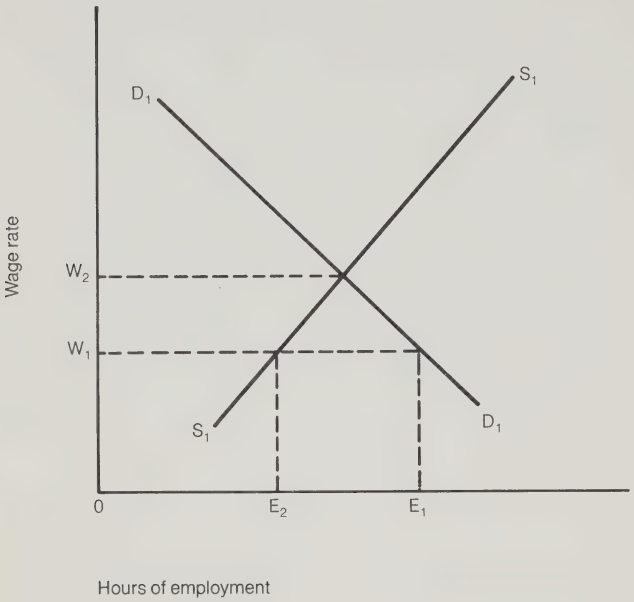
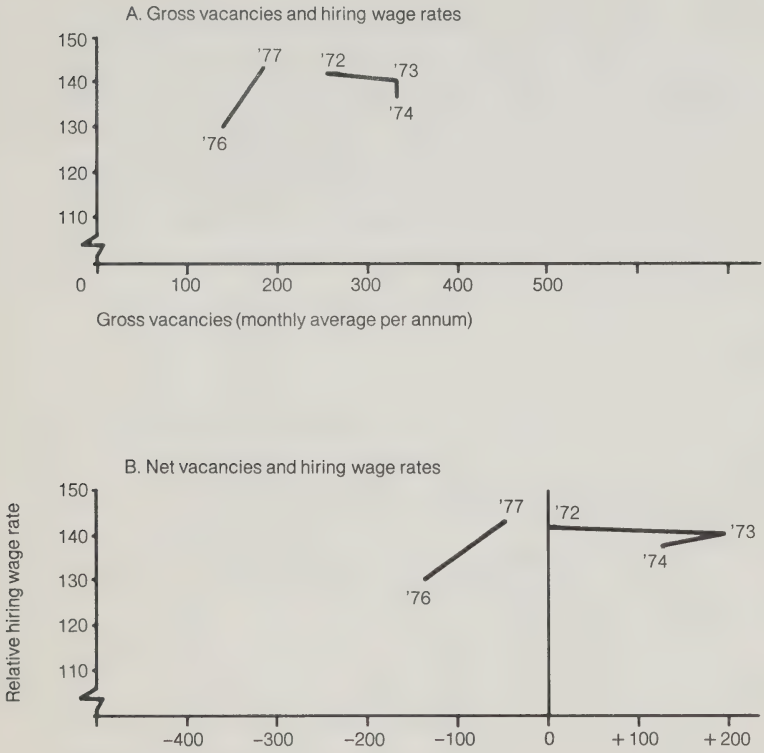


Figure 8 shows the recent relationships, over time, between tool and die makers' hiring wage rates (relative to the overall average of such rates), and both gross vacancies (panel A) and net vacancies (U - V) (panel B). The results of this exercise are inconclusive. As shown in Figure 8, the increase in vacancies in 1972-4 was not accompanied by an increase in relative wages; in fact, relative wages declined slightly. (This inverse relation exists whether the calculation uses gross or net vacancies.) The data for 1976-7, however, meet our expectations for the direction of change; the increase in both gross and net vacancies was

Figure 8
Hiring wage rates and vacancies for tool and die makers (Ontario, 1972-7)



Source: Tables A.13 and A.14.

Note: The JVS did not list wage data for 1975 since there were fewer than 100 vacancies that year.

associated with an increase in relative hiring wage rates.[14]

Average wage rates

When average wage rates are examined in relation to gross and net vacancies, an even less clear picture emerges, as shown in Figure 9.[15] With the exception of the 1972-4 period for Windsor, there is virtually no positive relationship between average wage rates and either gross vacancies or net vacancies. Regression equations fitted to the data sets are slightly positive when one uses gross vacancies in the calculations (panel A) and almost horizontal in the case of net vacancies (panel B). In fact, the regression of relative wages on net vacancies in the case of Windsor has a slightly negative slope.

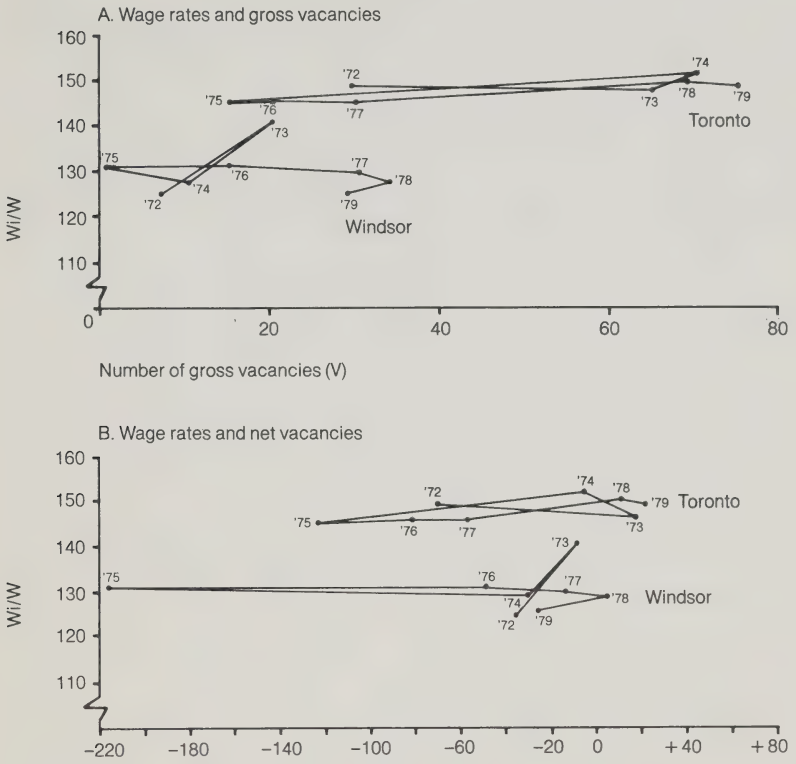
Conclusion

At this point, we are left with a puzzle. The evidence of vacancy data and employers' surveys suggests that, at least at the end of the 1970s and perhaps earlier as well, Ontario had a shortage of tool and die makers. Yet economic theory defines a labour shortage as the inability to recruit all the labour firms desire at the going rate. The hiring and average wage data for tool and die makers only partly support the other evidence that shortages existed during parts of the 1970s. Hiring wage changes for 1976 and 1977, the latest years available, are consistent with the existence of a shortage during this period, but earlier data are inconsistent with the other evidence of a shortage in 1973-4. Average wage data do not show the expected changes, except for the data on Windsor in 1973, which do show some response of wages to increase in vacancies.

14 Using gross vacancies in the calculation, the coefficient of elasticity of the change is 2.8 (i.e., a 1 per cent increase in vacancies resulted in a 2.8 per cent increase in relative wages). When net vacancies are used, the coefficient of elasticity is 9.9, suggesting that relative wages were even more responsive to the excess of vacancies over unemployed than to the change in vacancies alone.

15 For convenience' sake, the data used in Figure 9 were those on wage rates and vacancies in Toronto and Windsor, the two main cities in which tool and die makers are employed. It is worth remembering that since the vacancy figures were taken from CEC records, they probably understate the amount of change as already suggested.

Figure 9
Vacancies and relative wage rates for tool and die makers (Toronto and Windsor, 1972-9)



Source: Tables A.3 and A.12.

Note: The regression equations for the four cases are:

Toronto: $W = 145 + .06^{*}V \quad (R^2 = 0.51)$ (2.49)

$W = 149 + .02(V - U) \quad (R^2 = 0.34)$ (1.75)

Windsor: $W = 130 + .004V \quad (R^2 = 0.0)$ (0.02)

$W = 130 - .0009(V - U) \quad (R^2 = 0.0)$ (−0.03)

where W is the wage rate of tool and die makers relative to general labourers, multiplied by 100. V is the number of vacancies listed with CECs, and U is unemployed job seekers listed with CECs. t-statistics in parentheses; R^2 is the coefficient of multiple determination.

*significant at the 0.5 significance level.

Since the hiring wage, not the average wage, is most likely to respond immediately to a shortage, it can be said with confidence that the application of basic supply and demand theory does suggest the existence of a shortage of tool and die makers in the late 1970s. The lack of response of average wage rates may have been caused by wages being determined by other considerations, such as general contract negotations for unionized labourers. Since those tool and die makers who are unionized belong to bargaining units in which they are a small percentage of the total, one cannot assume that their particular situation counts for much in negotiations. Rather, the large bargaining units contribute to a narrowing of skill differentials in wages (see Starr 1973).

The lack of response in average wage rates may also relate to the size of the firms experiencing shortages. As we shall see in Chapter 4, the large firms tend to pay tool and die makers better than the small ones, and the high-wage employers I interviewed reported no shortages. The interviews also indicated that some employers did respond to hiring difficulties by improving wages and benefits. This last observation is consistent with the evidence of an increase in hiring wage rates at the time when it seems certain that there were shortages.

In summary then, the evidence of net vacancies, of employers' perceptions, and of hiring wage rates combine to give us a high degree of certainty that a true shortage of tool and die makers existed during the late 1970s.

4
Firms' responses to the shortage in the later 1970s

Chapter 3 demonstrated that a shortage of tool and die makers existed in Ontario during the late 1970s. This chapter's examination of how firms responded to this shortage will provide a background for an assessment of market developments in later chapters.

Simple demand-and-supply theory permits only a wage response to an excess demand for labour. But when we move to more sophisticated considerations and drop the ceterus paribus assumption, we find that economic theory allows a variety of responses (see Rottenberg 1956, Arrow and Capron 1959, and Freeman 1980). Firms are still assumed to maximize profits, but the ways in which they can respond to an increase in demand for a particular kind of labour go beyond raising wages to such actions as using overtime, training new workers, searching intensively for already qualified workers, lowering qualification requirements, improving the efficiency with which that kind of labourers are used, using persons with other skills to perform the work, introducing machinery to alter production methods, and subcontracting. All of these responses, of course, assume that the value of the increased output exceeds the increased cost of obtaining the additional labour input. When a firm believes no combination of methods will produce such a value, its response will be to curtail production or at least not to accept additional orders.

RECENT SURVEYS OF EMPLOYERS

Several recent surveys examined employers' responses to a perceived labour shortage in Canada at the end of the 1970s. Two of these surveys examined a variety of skilled labour occupations. Their findings will be described briefly before discussing a questionnaire that focussed specifically on tool and die makers.

TABLE 1
The response of firms to hiring difficulties

	Economic Council of Canada		MEMAC	Tool and die maker survey
	All trades	Tool and die makers		
Percentage with hiring difficulties	49.4%		84.6%	41.7%
Trained personnel	58.1	66.7%		20.0[a]
Overtime	37.1	55.6	81.8	60.0
Search outside region	35.2	25.0		
Lower qualifications for journeymen	26.9	13.9	19.7	
Improved wages, benefits	23.4	36.1		40.0
Curtailed production	17.2	30.6	9.1	20.0
Subcontracting	15.7	44.4	47.0	20.0
Search abroad	10.6	16.7	19.7	40.0
Use of less skilled labour			62.1	20.0
Automation			31.8	
Other			9.1	

a If the existence of an appricticeship program were included as a 'training personnel' response, figure would be 60 per cent.
SOURCES: Betcherman (1980, special tabulation on tool and die makers); MEMAC (1979); and survey I conducted for this study (see Appendix B).

The Economic Council of Canada survey

The Human Resources Survey (Betcherman 1980), taken by the Economic Council of Canada in the last quarter of 1979, received replies from 1354 establishments across Canada.[1] Of these firms, almost 50 per cent said they were experiencing difficulties in hiring skilled labour, and only a few less anticipated similar problems during the next five years (1980-4). Firms in Ontario reported the greatest difficulty in hiring labour for product fabricating, repair, and machining.

The surveyed firms' responses to these difficulties in hiring are summarized in Table 1. The majority (two-thirds of those facing a shortage of tool and die makers) responded by training personnel. The

1 The published version of the survey did not show data on tool and die makers specifically, but the author kindly provided me with special tabulations on them for this study.

next most common response was increasing the amount of overtime. Other responses in connection with tool and die making were subcontracting, improving wages and benefits, and curtailing production.

The MEMAC survey

When the Machinery and Equipment Manufacturers' Association of Canada (MEMAC 1979) surveyed 137 firms during the first quarter of 1979, it also included a listing of responses to difficulties in hiring skilled labour. As shown in Table 1, many of the responses received were similar to those indicated in the Economic Council of Canada Survey; however, neither training nor improvement in wages and benefits appeared on the list. Overtime was a significantly frequent response, as was using less-skilled labour and subcontracting. Automation ranked fourth as an attempted solution.

The tool and die maker survey

During the spring of 1980, I interviewed representatives of twelve establishments as part of this study. The objective of the interviews was to determine whether the firms were experiencing a shortage of tool and die makers and, if so, how they were responding. (The interview format is reported in Appendix B.) The firms selected ranged from small to large in size; all were in the Toronto area.

Over 40 per cent of the firms surveyed were experiencing difficulties in obtaining tool and die makers. As shown in Table 1, the most frequent response of these establishments was overtime. Improvements in wages and recruiting outside Canada showed up as next in importance. Only 20 per cent indicated the training of personnel, a much smaller figure than the one found by the Human Resources Survey. However, 60 per cent of the firms with shortages in my survey had apprenticeship programs for tool and die makers. Of these, two (40 per cent) of those with hiring difficulties had the maximum number of apprentices permitted them under Ontario regulations (see Chapter 2). Firms at or near the legal limit on apprentices may not have included 'training' as a response and instead may have indicated other things they were doing, thereby creating an understatement to the training response in my survey.

Another interesting variation in the surveys is the frequency of the 'curtailed production' response. It was much greater in the Economic Council's survey (30.6 per cent) and my survey (20 per cent) than in the MEMAC survey (9 per cent). It should be noted, however, that my respondent reported no actual reduction in production but rather a smaller increase than might otherwise have taken place.

My survey revealed a number of differences between the firms that were experiencing shortages of tool and die makers and the ones that were not. Those with no shortages had wage rates 16 per cent above the average for those experiencing shortages.[2] The no-shortage establishments were large firms, and all were unionized. Most of the firms with shortages were not unionized.

Another striking difference was the ratio of apprentices to journeymen. The firms with shortages averaged one apprentice to every five journeymen; in the firms with no shortages, the ratio was one apprentice to every eleven journeymen. The firms without shortages also had many more journeymen - an average of 131, compared to an average of nine for those experiencing shortages. Several of the larger firms had even laid off a number of tool and die makers, who were waiting recall at the time of the survey.

Some of the firms that were not experiencing shortages during the spring of 1980 reported they had had them previously and described their responses at that time; these were overtime, subcontracting, training, and recruiting abroad. The interviews also suggested a fairly recent increase in the amount of subcontracting and in the number of custom or specialty tool and die firms, many of which had been started by former employees of other tool and die firms.[3]

Three other points emerged from my detailed survey. First, there seem to be sizeable fluctuations in the employment of tool and die makers, especially by large firms. One firm estimated that in the next thirty months its employment of tool and die makers would increase by 270. (It expected to recruit most of the additional workers overseas.) But, it believed, twenty-four months after that its employment of tool and die

2 The surveyed firms with no shortages were paying an average wage of $10.82 per hour; those with shortages were paying an average of $9.36.

3 No indication was given as to how much of this subcontracting went to Canadian firms and how much to foreign firms (including those in the United States).

makers will decrease by 230. Such fluctuations seem to be most pronounced in the aircraft and automobile industries.

Second, there has been a long-term decrease in the total number of tool and die maker positions, an obervation consistent with the data from censuses and the Occupational Employment Survey (see Table A.11). This phenomenon may be related to an increase in the number of custom tool and die firms.

Finally, the survey indicated that employers view tool and die making as a good background for promotion. One-third of the firms reported that a majority of persons who had formerly been doing tool and die work for them were now in supervisory positions or higher technical jobs within the same firm.

To summarize: the universal response of firms to shortage in the late 1970s was to increase the amount of overtime worked by existing staff. Lower-paying firms have also increased the amount of training they offered. Higher-paying firms had few shortages, at least in the spring of 1980; if they needed small numbers of additional tool and die makers, they were able to recruit them in the local labour market. The long-term response of higher-paying firms has been to subcontract work and to recruit labour overseas.

5

The reasons for recurring shortages

This chapter discusses the reasons for the recurring shortages of tool and die makers. Labour shortages may be caused by fluctuations in demand (caused by developments in the product market), by fluctuations in the supply of the particular type of labour, or by a combination of the two. Using economic theory and available data, we shall examine fluctuations in the demand for and the supply of tool and die makers and consider why neither many employers nor many persons in the labour force seem to have acted as though they anticipated the recurrence of shortages.

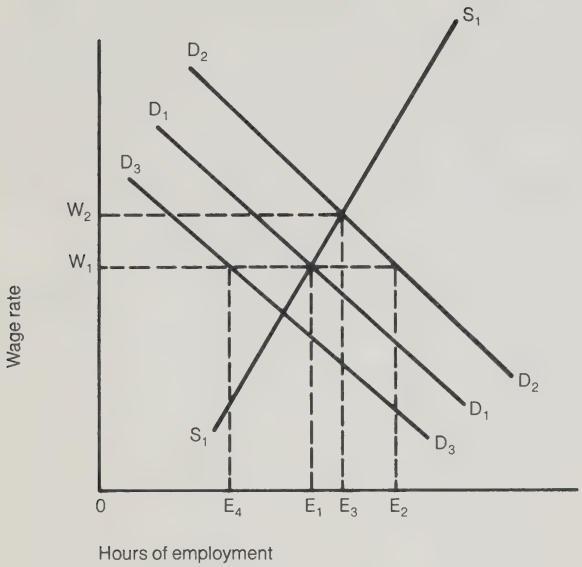
FLUCTUATIONS IN DEMAND

According to economic theory, if fluctuations in demand are unanticipated, each increase catches employers unaware and they attempt to recruit labour by bidding up the price. Subsequently, demand decreases and wages fall - but only in relative terms because of the downward rigidity of money wages. (In other words, when there is an excess supply of labour in a particular occupation, money wages may still increase, but they do not go up as fast as those of other occupations.)

This pattern is depicted in Figure 10, which assumes that the supply curve S_1S_1 remains unchanged while demand fluctuates between D_2D_2 and D_3D_3. Wages rise and fall accordingly. When demand falls below D_1D_1, however, the model assumes that wages will not fall below some minimum, W_1; firms do not risk losing too many skilled persons lest they have to incur the costs of recruitment and induction when demand rises again.

Let us see if the available data on tool and die makers suggest such a pattern of fluctuating demand (setting aside for the moment the question of whether any fluctuations we find have actually been unanticipated). Here we again run into the problem, mentioned in Chapter 3, of the paucity of

Figure 10
Fluctuations in demand for labour

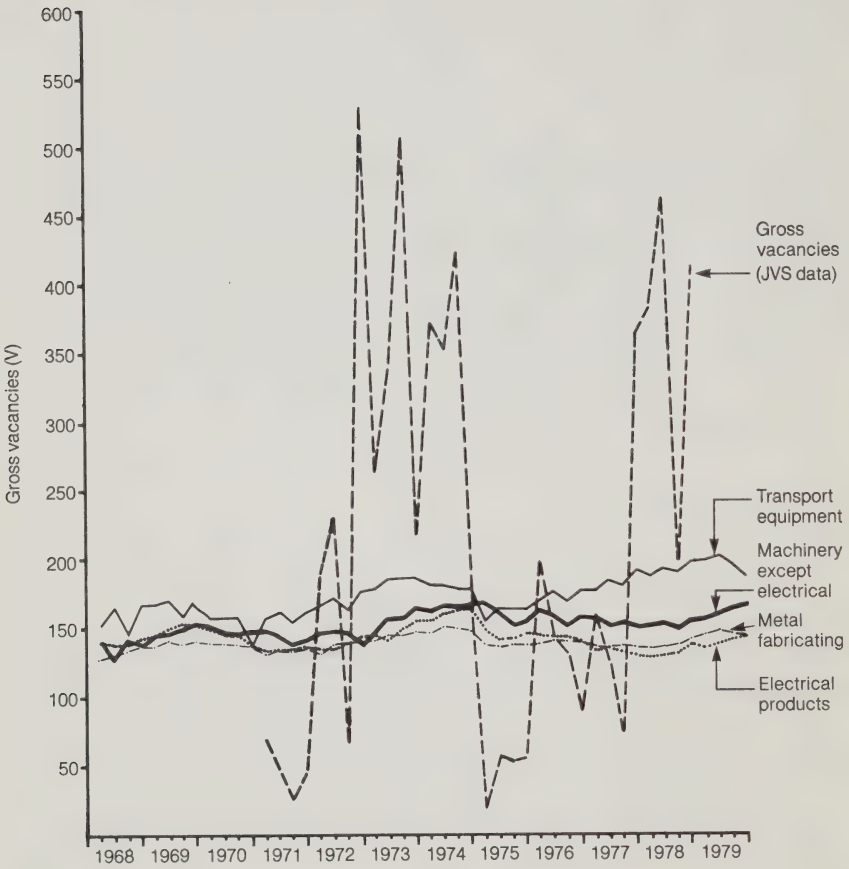


data on employment. There are no figures on the total demand over time for tool and die makers, only the stop-motion pictures of employment given by the census or the Occupational Employment Survey. Unfortunately, the most recent data from these are for 1971 and 1975 respectively, and the previous chapter's study of vacancies leads us to suspect that both years were periods of particularly low demand.

Nevertheless, one can find some evidence to support the hypothesis that the demand for tool and die makers has fluctuated during the past decade or so. The first such evidence is the quite large variation in the vacancy rate discussed in Chapter 3.

Another piece of evidence can be gained by examining the patterns of change in employment in the industries that use most of Canada's tool and die makers. Figure 11 compares these patterns with the pattern of change in the vacancy rate for tool and die makers. It shows that each of the

Figure 11
Employment indexes of manufacturing industries using tool and die makers (Ontario, 1968-79)



Source: Tables A.9 and A.15.

four industries did experience cycles similar to those of vacancies for tool and die makers.[1]

It is also worth noting that the industries that use tool and die makers had a 7.1 per cent increase in overall employment between 1971 and 1975 (see Table A.15). By contrast, the number of tool and die makers employed remained unchanged. Some of this lack of growth in employment may have been caused by tool and die makers making relatively greater increases in productivity than did workers in other occupations in the same industries, although it is difficult to estimate the size of such an effect. The lack of increase may also reflect either a change in companies' mixes of products or an increase in the subcontracting of tool and die work to other countries. It is also possible that the 1975 Occupational Employment Survey underestimated the number of tool and die makers.[2]

Finally, the demand for tool and die makers was almost certainly affected by the cyclical declines in overall employment that all four industries experienced during 1969-71 and 1973-5. Since the sizes of these declines are known from Statistics Canada's quarterly employment indexes, one can calculate their probable effects on tool and die makers by assuming that they had an equal impact on all the occupations they use (see Table A.16). During the two periods, the transportation equipment industry experienced the largest decline both in percentage decrease in employment and in the number of tool and die maker positions affected. The second largest decrease in terms of possible tool and die employment was in metal fabricating. In terms of overall employment decreases,[3] the estimated reduction in employment of tool and die makers in 1969-71 was slightly less than during the 1973-5 period.

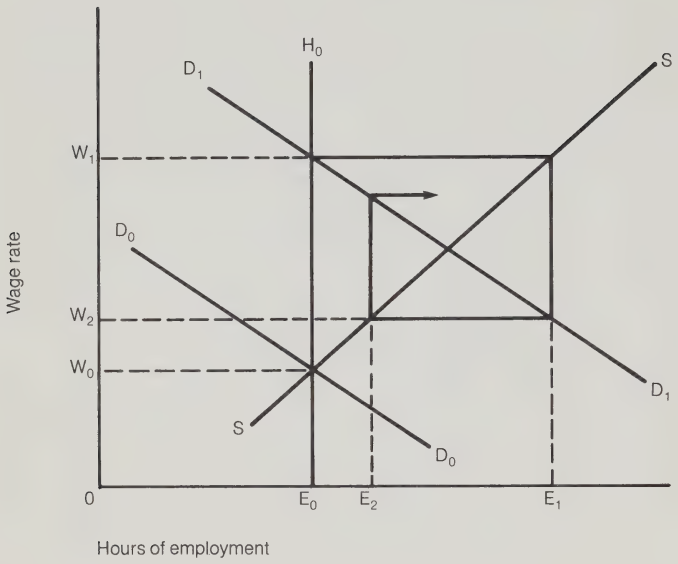
All these data suggest that there have been fluctuations in the demand for tool and die makers and that these fluctuations were consistent with the patterns of change in vacancies.

1 The patterns are not as regular, however, as that of the changes in the tool and die making vacancy rate, and they do not entirely coincide with each other. The cycles in transportation equipment industry (which includes the manufacturing of both automobiles and aircraft) were most similar to those of the vacancy rate. In the other industries, the demand for tool and die makers reached cyclical turning points before overall employment did.

2 As previously noted, the reliability of the OES data are subject to some question (see Canada 1979a).

3 The calculations were based on changes in the labour force since employment figures are not available for 1969 or 1973.

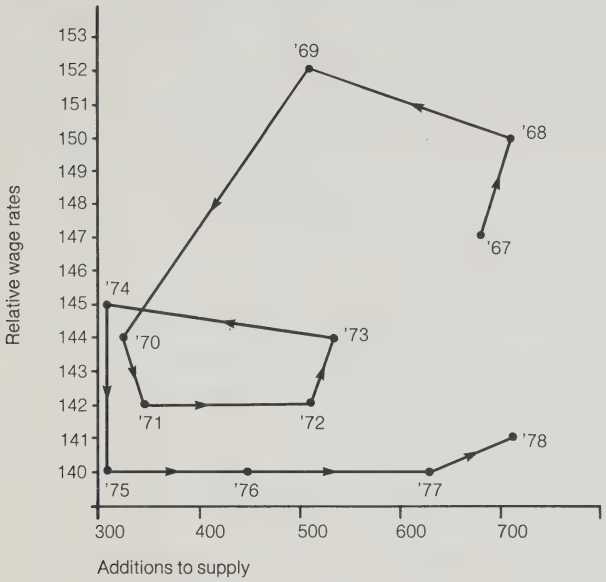
Figure 12
The cobweb effect



FLUCTUATIONS IN SUPPLY

An alternative hypothesis for explaining the cyclical shortages of tool and die makers is fluctuation in the supply of labour. In economic theory, one supply-side explanation is known as the cobweb effect. It is best illustrated by Richard Freeman's analysis (1975) of such labour markets as that for lawyers. This type of situation occurs when supply changes follow but lag developments in the market. As shown in Figure 12, a once-and-for-all increase in demand with no immediate change in the quantity supplied triggers an initial reaction of an increase in the wage rate. In response to this rise, the quantity supplied increases markedly during the next period. The result of this increased supply is a reduction in the wage rate, which, in turn, leads to a lowering of wages

Figure 13
Relative wages for tool and die makers and additions to supply lagged by one year (Ontario, 1967-77)



Source: Tables A.3, A.7, and A.8.

Note: Additions to supply were calculated as the sum of new immigrants plus apprentice registrations. Relative wage rates were calculated by weighing the available data for the selected cities in Table A.8 by the number of tool and die makers in Ontario in 1971.

during the subsequent period. When wages are reduced, persons leave the occupation and supply drops again. The process of wage changes and subsequent supply changes continues. If the cobweb is stable, the swings between shortage and surplus decrease over time, and gradually the process works itself out.

Has this phenomenon occurred in the tool and die makers' market? A complete answer would require more data on employment than is available, but it can be calculated roughly by graphing known wage rates against

additions to the labour supply, using data from apprenticeship registrations and immigration.[4] Figure 13 gives the results when these additions are lagged by one year. It shows not the expected cobweb effect but the reverse: wage increases in one period are associated with decreases in supply during the next period and vice versa. Moreover, by combining these additions with the base figure of tool and die workers found by the census, we can see that the short-run response of additions to the labour supply was inelastic to changes in relative wage rates throughout the period 1968-76. A one per cent change in relative wages produced less than a one per cent increase in the number of apprentice and immigrant tool and die makers.[5]

Additions from trainees and immigrants

Supply is also affected by the number of apprentices who complete their training and become journeymen. As we have already seen, the number of persons registered as tool and die maker apprentices in Ontario is now at the highest level it has ever been (see Table A.7), reflecting a sharp increase that coincided with the recent cycle of high demand and the establishment of tool and die making as a certified trade. Canada Employment Centres cannot find places for all the individuals who would like to become apprentices. Yet this phenomenon must be contrasted with the long-term decrease in the percentage of apprentice completions, to the present figure of less than 50 per cent (see Table A.7). Although this decline appears to be secular, there may also be an inverse relationship between the completion rate and the cyclical level of demand at the time of registration. Persons who enter the apprentice program during a high point in demand may be the least likely to complete it since, as we shall

4 A complete analysis would take account of persons who left or returned to tool and die making at various wage rates as well as changes in the supply caused by deaths and retirement. Although the calculations here omit these factors - and given the 30 per cent outflow from the occupation that we saw in Chapter 2, they could be significant - using only additions to the labour supply yields approximations that are sufficient to suggest a pattern or lack of one.

5 Measuring the overall elasticity of supply would be an even more interesting exercise, but it is impossible to do because it would require data on the number of qualified workers who return to tool and die work from other occupations in response to various increases in wage rates.

see, they are the most likely to be laid off in the subsequent downturn.

Finally, one might note that immigration continues to be the most important source of additions to the supply of tool and die makers (see Tables A.6 and A.8). Since immigration regulations are such that these additions are determined almost entirely by the state of the labour market and since additions to the occupation show no positive relationship to the wage rate, we must conclude that supply has responded primarily to changes in employment opportunities (as reflected in the vacancy rate), and not to changes in relative wage rates. No evidence of a cobweb effect exists.

Outflows from tool and die making

Outflows from the occupation are also an aspect of the supply situation. The absence of year-by-year employment data makes it difficult to determine precise outflows over short periods, but we can use intercensal data to make some estimates. Between 1961 and 1971, the number of tool and die makers in Ontario dropped from 8330 to 8200. During this period 1621 immigrants entered the trade in the province and 1175 completed training; hence, 3272 persons must have left it for some reason. Using normal attrition rates (see Meltz and Penz 1968), one can assume that 1291 of them left because of death or retirement. So the remaining 1981 - almost one-quarter of the base figure - must have either left the province or taken up other work. (See Table A.17 for the details of this calculation.) Since most of the country's tool and die making is done in Ontario, one can only suppose that the majority of these persons left the trade.[6]

ANTICIPATION OF THE RECURRENCE OF SHORTAGES

If the major source of the recurrent shortages of tool and die makers is fluctuations in demand, one would expect both employers and labourers to

6 Given that tool and die making is one of the highest-paying blue-collar occupations in manufacturing and given the existence of a shortage for a number of years during the 1970s, 24 per cent outflow above anticipated attrition seems large. Nevertheless, it is the figure the available, scattered data admits. The question of where these workers went - and why - would be a valuable subject for future study.

anticipate these developments. Yet there is little evidence that either group has, unless one counts the recent upswing in apprentice registrations, which may be a reaction to employment opportunities rather than to anticipated demand and which is partially offset by the low completion rate.

One possible explanation for this apparent lack of foresight is that the fluctuations in demand are random and can not be anticipated. But although this may be the case for individual firms, the regularity of the changes in demand discussed in Chapter 3 suggests that, on balance, it should be possible to anticipate general patterns for the tool and die makers' market as a whole. We must, therefore, examine the situations of both employers and labourers for other explanations.

The employers' side

In the case of employers, given the high costs of recruitment and the probability of a labour shortage during periods of peak demand, one must ask two questions: (1) Why don't firms retain a larger stock of tool and die makers during a down turn instead of laying them off? (2) Why don't firms expand their training programs in advance of an increase in demand? A quick possible answer to both questions is that firms perceive the cost of maintaining a larger stock of manpower as greater than the cost of last-minute recruitment. Revealed preference (see Table 1 for the responses to my detailed interviews) seems to support this explanation, especially for higher-wage firms.

More answers to these questions relate to the structure of the market for tool and die makers. As we saw in earlier chapters, it can, for the most part, be divided into two submarkets: one consists of high-paying, generally larger firms that have not experienced shortages; the other, of smaller, relatively low-paying firms that have experienced shortages and difficulties in hiring tool and die makers. It is the high-paying firms that have tended to rely on hiring in the market or recruiting overseas; the long-term trend seems to be for them also to increase their subcontracting of tool and die work. The lower-paying firms have relied more heavily on training.

Data are available to support the hypothesis that the large firms do very little training. A recent survey of labour union contracts in Ontario showed that of 1016 large firms (over 200 employees) in the four sectors in

which 85 per cent of tool and die makers work, only sixty-one (6 per cent) had apprenticeship clauses.[7] An examination of the apprentice-employers list maintained by the Ministry of Colleges and Universities, Apprenticeship Branch, shows that of those sixty-one firms, which employ an estimated 1450 to 1900 tool and die makers,[8] only sixteen actually had tool and die making apprentices and that their trainees totalled a mere 126 individuals.

Thus, given the total of 1217 tool and die apprentices in the province, the data indicate that over 90 per cent of all the training of tool and die makers is being done by firms with fewer than 200 employees.[9] Support for this conclusion comes from an examination of the names of the firms that do undertake training; most appear to be tool and die specialty firms, which, as we have seen, are relatively small outfits.

The number of these speciality firms has grown in recent years, presumably in response to large firms' increasing proclivity to subcontract tool and die work. These speciality shops tend to be in the lower-paying group, but their employment of journeymen at least seems to be subject to fewer fluctuations than that of the higher-paying, large firms, especially those in the automobile and aircraft industries[10] although data were not available to explore this point extensively.

What is certain for firms of all sizes, however, is that when demand declines, layoffs occur. Since the large firms have few apprentices, the workers they lay off are, for the most part, journeymen. When these workers are laid off, they tend not to seek other jobs but to await recall. Their reasons for choosing this course can only be surmised but almost certainly include their eligibility for Supplementary Unemployment Benefits (SUB) and their reluctance to take lower-paying jobs in the small shops

7 The Ontario Ministry of Labour prepared this data from a computer tabulation of collective agreements. It also showed that few large firms seem to train apprentices in any occupation. Of 3001 union contracts with large manufacturing firms, only 131 included apprenticeship clauses.

8 These estimates were derived from the number of tool and die makers in those of the sixty-one firms that responded to the Wage Rate Survey conducted by Labour Canada, which provided me with the unpublished data.

9 Notice that this statement makes what seems a safe assumption: that there were no nonunionized firms with 200 or more employees with any significant numbers of tool and die apprentices.

10 Dufault (1976) found this correlation in Windsor.

that may still be looking for experienced tool and die makers. A desire not to forfeit seniority may also be present. In addition, low-paying firms may be reluctant to hire such workers, fearing that they will leave when the higher-paying firms recall workers; moreover, small firms, which are in a very competitive situation, may differ from the large ones in expectations about the pace of and approach to work.[11]

The availability of SUB and other factors that encourage laid-off workers to await recall may explain why large firms do not find it worthwhile to carry an inventory of tool and die makers over the trough of a demand cycle. When the demand rises, these firms can turn to a pool of waiting former employees. If it proves insufficient, their high wage rates enable them to meet their needs by recruiting in the market or overseas.

Lower-paying firms are in a somewhat different situation. When a demand cycle turns downward, many have relatively large numbers of apprentices; they are usually the first to go, even though these shops tend to be nonunion. The alternatives for these companies would be to lay off journeymen and retain apprentices or to retain both. In many cases, the first alternative is impossible because the firms that do the training tend to maintain the maximum apprentice-journeyman ratio permitted by law. Moreover, apprentices are generally not productive, at least in their early years. Hence, the firms lay them off first and only later, if necessary, let journeymen go. Finally, the small firms tend to be custom tool and die firms, so the bulk of their employees - journeymen and apprentices - are tool and die makers; the impact of retaining all of them in periods of low demand would be, therefore, greater than in firms where tool and die work represents a small proportion of the total. Thus, the regular cycles of lay-offs are most felt by apprentices, whose wages and productivity are less than journeymen's.

In brief, it appears that small firms and large firms reach the same conclusion in times of low demand for tool and die makers, although for somewhat different reasons. Both see the cost of carrying an inventory of these workers as being greater than the cost of laying off apprentices (if they have any) and journeymen as demand drops and attempting to hire them later as it rises again.

11 These last two suggestions were made by Maurice Barnes of the Weston Canada Employment Centre.

Both small and large firms also act in a surprisingly similar fashion when it comes to acting - or, rather, not acting - in advance of high-demand periods. In my small sample of establishments, large and small, half (six out of twelve) did conduct some manpower forecasting. The Economic Council of Canada (Betcherman 1980) also found that half of the establishments it surveyed had prepared forecasts. But of the six establishments that reported forecasts to me, only three had communicated their needs for skilled manpower to local community colleges, perhaps the most logical place for an Ontario employer to seek advance help.

Another logical action for employers would be to expand (or start) training programs in advance of cyclical increases in demand. Small firms' failure to do so may be partially related to the current structure of tool and die making. Since these firms tend to be custom shops, many of the orders they receive are subcontracts; hence, it is difficult for them to know their long-term needs.

The high-paying firms, on the other hand, do not experience shortages. Since they are able to meet their needs through recalling laid-off workers and/or recruiting in the market or overseas,[12] they have little incentive to start or expand training programs in advance of increases in demand.

Since virtually all of these large, high-paying firms are unionized, one must ask if the fact of unionization has affected the likelihood of their providing training. The answer appears to be no, although some indirect effects may exist. Although most union contracts regulate the ratio of apprentices to journeymen and the order of layoffs, these regulations per se do not appear to have been a significant factor in reducing the overall amount of training. A recent Ontario Manpower Commission study indicates that unionization does not affect the level of apprenticeship overall (Ontario 1980, 33). Officials of the unionized firms I surveyed indicated that they could reach an accommodation with the relevant union if it became necessary. Some contracts in the automobile industry include a provision

12 Given the large firms' high rates, one would expect that some of them might indulge in raiding, especially of the low-paying firms that offer training. Although this expectation is often offered as a reason for not establishing training programs my survey suggests that little true raiding occurs. Workers do move - among large firms, as well as from small to large - but large firms rely far more on overseas recruitment than on raiding in times of shortage.

that could be used to reduce the amount of training required in some circumstances. The same provision, however, may have some indirect effects on apprentices since it permits no credit for training in trade or vocational schools. As we shall see, this provision may discourage laid-off apprentices from undertaking further training in a community college.

Unions may also have an indirect effect on apprenticeship in that the unionized firms tend to be the high-wage firms and hence the firms best able to recruit in the market and overseas without having to engage in training. Moreover, since apprentice wages are set as percentages of the wages a particular firm pays journeymen, the higher its average wage the more costly the apprentice.

The would-be employees' side

Even if employers, for various reason, have not found it profit-maximizing to act in advance of shortages of tool and die makers, one would think that workers would attempt to take advantage of their cyclical recurrence. In particular, given recent overall unemployment rates and the relatively high wages commanded by tool and die makers, why are young men not entering apprenticeship in numbers more than sufficient to meet peak demand and obviate any need to recruit overseas?

The problem here is the phrasing of the question. Young workers do perceive the occupation as desirable - as we have seen, the apprenticeship rolls are at an all-time high and Canada Employment Centres report far more persons wanting to enter them than positions available. The true question is why fewer than half the tool and die apprentices in Ontario are finishing the program. The answers seem to lie in the structure of the market and the structure of the training.

The first factor working against an individual's remaining in apprenticeship is the length of the training program vis-a-vis the length of the demand cycle. The formal apprenticeship program requires four years of full-time work (including some relatively brief intervals in the classroom). The MEMAC survey (1979, 7), not surprisingly, found that one of the main reason for dropping out of apprenticeship was impatience at its length. Cyclic demand compounds the problem. If demand drops while a person is in apprenticeship, he may believe it will eventually go back up again, but he is faced with the immediate problem of continuing

employment during the down swing. This may be difficult to do since, as we have seen, the firms that offer training tend to lay off apprentices during periods of low demand.[13] Theoretically, of course, a laid-off apprentice could accept other employment for a while, then return to tool and die making when the demand swings back up. Some individuals undoubtedly do follow this course, but it is not an attractive one. At the very least, it lengthens the training period, perhaps by several years. Moreover, the laid-off apprentice, who may be without other skills, is faced with the need to earn a living once his (probably meagre) Unemployment Insurance benefits run out. If he is successful in doing so, he may be reluctant to return to the uncertainties of apprenticeship when a position becomes available.

A would-be tool and die maker can avoid some of the problems of layoffs by enrolling in one of the community college training programs. Doing so today, however, has three practical drawbacks that loom large. First, no Ontario college program offers more than 3400 of the required 8000 hours of training; the student must still find employment as an apprentice for the rest, leaving himself open to the risk of layoffs. Second, some firms have reservations about the colleges' instruction in terms of suitability for employers' needs. (Moreover, as we have noted, union contracts in the automobile industry do not recognize training received in a school rather than a firm.) Third, a community college student must pay for the program without any income assistance; he receives no wages, whereas an apprentice receives 50 to 85 per cent of the journeyman's rate, and he is not eligible for assistance under the Canada Manpower Training Program (CMPT) because tool and die maker training exceeds the fifty-two week maximum permitted under CMPT. Since apprentices average over 21 years of age, the uncertainties of finding employment after completion of a college program, together with its financial drawbacks, make this route to training much less attractive than enrolment in an apprenticeship program with a company.

Another factor working against persons remaining in apprenticeship is the difference between the earnings of apprentices and those of unskilled workers. In almost all firms, even a fourth-year apprentice makes less

13 By the same token, a person who wishes to enter apprenticeship during a low-demand period may have difficulty finding the requisite employment since firms have few apprenticeship openings at such times.

than a general labourer employed by a high-paying firm. Granted that the individual who becomes a journeyman can expect a sizeable return on his investment of time and foregone income during apprenticeship,[14] the wage differential during that period, however, tempts some young people away from training. The MEMAC survey (1979, 7) reported that a belief in being able to make more money elsewhere was the most important reason for apprenticeship drop-outs.

It should be noted that it is undoubtedly government regulation that is keeping the wage differential from increasing even more at the present time. The excess of would-be tool and die apprentices over the positions available should be exerting downward pressure on the wages of apprentices. Only the fact that apprentice wage rates are set by government regulation as a sliding percentage of a firm's average journeyman's rate prevents them from falling within firms. However, the fact that most of the firms that are doing the training are relatively low-wage firms means, in turn, that they have relatively low wage rates for apprentices.

CONCLUSION

The major reason for recurring shortages in the tool and die maker labour market is cyclical fluctuation in demand. During the 1970s, firms did not carry stocks of workers during downturns because they knew they would be able either to recruit overseas or to increase their intake of apprentices when demand increased. These apprentices appear to have made positive contributions to output; if they had not, it would be difficult to explain why the cycle of apprenticeship registrations corresponds to the cycle of demand for tool and die makers. The rise in apprentices almost certainly reflects young peoples' perception of present employment opportunities. It

14 See Table A.4. Using conservative estimates, it suggests a prospective net increase of $267,348 in current dollars for a Toronto resident who chooses tool and die making over general labour; the comparable figure for Windsor is $203,080. Even allowing for an apprenticeship-noncompletion rate of 50 per cent and not considering the probability of lucrative overtime work, the prospective increases in lifetime earnings are $135,000 and $102,000 for the two cities respectively. These are impressive figures, even without knowing the exact rates of return. (To calculate these, one would need to estimate the length of employment and the direct costs of training as well as the likely long-term relationship between the earnings of tool and die makers and those of general labourers.)

could also represent some firms' beginning to anticipate cyclic demand.

The test will come when current demand falls off. If firms then retain their tool and die makers and carry apprentices through their training programs, we will know they are anticipating future demand.

The further implications of the cyclical patterns of demand and apprenticeships and the underlying market imperfections they suggest are discussed in the next chapters.

6
Market imperfections

Given the existence of shortages of tool and die makers that neither employers nor labourers have alleviated, the question becomes whether the situation warrants further government intervention. In an attempt to find an answer, this chapter examines the impact of the shortages and the extent to which they arise from market imperfections.

THE IMPACT OF THE SHORTAGES

As we have seen, the recent shortages of tool and die makers have not affected all firms equally. Rather, they have been experienced mostly by small firms, which have relatively low wages rates. These employers' primary response to shortages, after pushing overtime to the maximum possible, has been to increase apprenticeship training. Yet this response has not been a successful solution to the problem since, for various reasons, only about half of the young men who entered apprenticeship in the mid-1970s actually completed the program.

Larger, higher-paying firms have also experienced cyclical fluctuations in their needs for tool and die makers, but they have been able to meet them by recruiting in the domestic market and overseas. These firms apparently see no need to provide much training and provide relatively few apprentice places.

THE IMPLICATIONS OF THE SHORTAGES

How has the shortage of tool and die makers affected production costs and output? How do the costs of training fit into the overall picture?

A process of rationalization seems to be taking place in response to

the shortage of immediately available journeymen during cyclic upswings in demand. Large firms recruit overseas, but they also subcontract an increasing amount of tool and die work to small speciality shops. This course allows them to overcome the lag between the time they identify a need too great to meet in the domestic market and the date on which immigrant recruits can start work.[1]

The increase in the amount of subcontracting and consequent growth in the number of firms specializing in tool and die work may be positive developments if they reduce the net cost of producing tools and dies or increase the overall quality and speed of production per dollar of cost. A detailed examination of the actual tool and die production costs is beyond the scope of this study. Nevertheless, my general impression is that developments may have reduced some of the upward pressure on costs. First, subcontracting generally involves shifting work to firms that pay tool and die makers relatively low wage rates. Second, the lower-paying firms are the ones that are doing most of the training, a fact that, in turn, lowers direct training costs since apprentices' wages are a percentage of the journeyman's wage rate in each firm. Third, despite the vaunted shortages, the wages of tool and die makers have increased little relative to those of other occupations (see Tables A.3 and A.4). On the other hand, most firms' initial response to the shortage is to hand out overtime work; its premium rates raise labour costs for tool and die work. More analysis is necessary to determine the overall impact.

Have firms' various responses been sufficient to maintain production? Or, to turn the question around, has the labour shortage resulted in actual losses of production? Opinions differ. The Economic Council's Human Resources Survey (Betcherman 1980) indicated that 30.6 per cent of firms that had experienced shortages of tool and die makers had curtailed production, but the comparable figure for the MEMAC survey (1979) was only 9 per cent. My own small survey showed a 20 per cent rate. It is worth noting that the one firm in my sample that indicated curtailed production said that this was a smaller increase in production rather than an actual reduction. In the larger samples, it is not clear whether firms

1 It takes an average of 147 days for an offshore immigrant to reach Canada after applying for entrance. (This figure was provided by George Brown, the economist for the Toronto District of the Canada Employment and Immigration Commission.)

actually lost orders because of the shortage or simply thought they might have been able to obtain more orders if they had had additional tool and die makers.[2]

Views also differ about the costs of apprenticeship training. One survey estimated the total costs of supervision and lost production over a four-year period at $27,415 in 1976 dollars (Canadian Tooling Manufacturers' Association 1976).[3] This estimate indicated that an apprentice's wages exceed the value of his output until he has completed the full four-year training program. Some of the employers of tool and die makers I interviewed, however, suggested that the value of an apprentice's output may exceed his wages as early as the end of the second year of training.

It may be that this apparent contradiction signals the existence of different cost structures for training that depend on the size and type of firms as well as the number of trainees. It may be more efficient for small specialty firms to engage in apprentice training while manufacturing firms use only journeymen and confine their tool and die work to maintenance and repair. Additional research is needed to explore the costs of training in various types and sizes of firms.

If it does cost less for the specialized, lower-paying firms to provide the training, there remains the related question of whether these firms receive a sufficient return on their investment. To put it another way, are higher-paying firms bidding away newly trained journeymen before these workers provide the training companies with an adequate return for their investment in apprentices? The interviews I conducted suggested no serious problem with the immediate loss of newly trained journeymen. Some firms did report turnover, but it was not identified specifically with just-trained workers. Harvey (1980) also found that firms that engaged in training did not experience a significant loss of workers after the training was completed; only nontraining firms believed that employees would leave soon after they completed apprenticeship (and often gave that belief as a reason for not offering training).

2 The distinction is relevant because so many tool and die orders are put out to tender for subcontracting. Firms that do such subcontracting work may have overestimated the number of orders they would have received if the manpower had been available.

3 A later survey of the costs of machinist training put the figure for direct expenses at $38,080 (Currie, Coopers and Lybrand 1978). One would expect the cost of training for tool and die making, which requires greater skill, to be higher.

ARE THE SHORTAGES RELATED TO MARKET FAILURE?

A market failure exists if the flow of resources to that market is impeded by such things as barriers to entry, factor immobility, or lack of information. The existence of a market failure can justify government intervention in the absence of other remedies.

Is there evidence of market failure in the labour market for tool and die markers? The evidence of recent years suggests there is, in two or three ways.

Apprenticeship drop-outs

One such failure is marked by the present low completion rate for apprenticeships. The fact that only about half of those who now enter apprenticeship actually complete it means that the occupation is suffering a substantial loss of persons who had been prepared to invest in a career in it. Many of them give up when layoffs caused by drops in demand interrupt their apprenticeships. This indicates that there are people who might have obtained positions in tool and die making had they been able to maintain their training until the next increase in demand - on average, less than two years after the period of lowest demand. The inability to retain more than half of those who enter apprenticeship suggests a market failure, at least part of which is caused by layoffs during periods of reduced demand.

The market failure, in this instance, encompasses the workers who have invested time and foregone wages in apprenticeship but do not complete the program and the employers who have invested the costs of both supervision and the shortfall between the wages paid to apprentices and the value of their output. The low completion rate means that both the half-trained workers and their employers lose their investments. At present, no mechanism exists to absorb the costs of continuing the apprenticeship program when the demand for tool and die makers declines during the downward phases of the recurring cycles.

Lack of coordination with community colleges

A second market failure is the lack of major links between employers and

the community colleges in the development of programs to produce adequately trained tool and die makers. At present, firms pay little attention to the community college technician programs, in part because these programs provide what employers perceive as insufficient experience on the shop floor. Ways need to be found to encourage employers to communicate their needs to the community college system. Additionally, research is needed into the many possible mixes of industrial and institutional training.

Moreover, my survey raises the question of whether four years of training are truly necessary. Some firms in my limited sample reported that apprentices are productive after two years. If this is generally true, it may be possible to reduce the length of shop-floor training.

A related problem results from the absence of the type of coordinated training-industry approach that occurred during the Second World War (see Ontario 1942, 29). My survey of firms that employ tool and die makers indicated that perhaps only one in four with hiring difficulties is communicating its needs to training institutions.

Another problem in this area is the financial disincentive for individuals to seek training in the community college programs. As noted in the next chapter, the Canada Employment and Immigration Commission apparently has plans underway to provide some assistance to unemployed apprentices so they can continue their training after layoffs. Other approaches could also be considered.

Dependence on foreign supply

The inability of domestic sources of supply to meet peak demand in the market for tool and die makers could also be said to be a form of market failure. On the other hand, employers' past ability to recruit directly or indirectly from overseas has largely made up for this failure. Buckley and Nielsen (1976) have argued that the ready availability of overseas recruits has reduced the incentive to train in Canada; firms do not have to plan for peak needs since they believe they can always obtain workers overseas. Presumably, they view recruiting there as costing less than retaining skilled workers who are underemployed between peaks.[4]

4 The Canada Employment and Immigration Commission told me, however, that once employers have been authorized to recruit overseas, they

Unionized firms especially may also view overseas recruiting as cheaper than going into the domestic market and bidding up wages that would affect employees in occupations other than tool and die making.

The overall impact of such heavy dependence on an external source of supply is difficult to estimate. A simple benefit-cost analysis suggests that it is cheaper to import skilled workers since the costs of training do not have to be borne in Canada (see Wilkinson 1965). On the other hand, it has certain hidden costs. Daly and Globerman (1976) have argued that one such cost is a slowing of the introduction of new technology into Canada. The ready availability of external supplies of certain types of skilled labour may reduce the links between industry and the community colleges and thus impede the development of new types of processes.[5] A second cost is associated with the prevailing view that Canadians are not being given the opportunity to develop skilled trades. Society seems to feel that there should be less reliance on overseas recruiting in the skilled trades.[6] In addition, it is anticipated that in the future fewer skilled immigrants will be available, at least from traditional sources of supply.

The role of immigration as a ready source of supply may also relate to hiring wage rates' uncertain response to the periodic shortages. To the extent that the external sources of supply are regarded as part of the overall labour market, this lack of wage response cannot be viewed as a market failure. As suggested earlier, firms have used a variety of other responses.

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have to incur costs for advertising, interviewing, and the like that are much the same as those in the domestic labour market. In addition, they incur travel costs. On the other hand, it may be that, at least in the past, the unit costs of recruiting overseas were lowered by interviewers' being able to reach a large number of potential candidates. The existence of such economies of scale may explain why it is the large firms that have tended to do the overseas recruiting.

5 The possible cost of delay in the development of new technology may be offset by the dynamic elements that immigrants introduce into Canadian society.

6 The Canada Employment and Immigration Commission is following an approach consistent with this view by reducing immigration intake and requiring evidence that firms are prepared to increase their training within Canada.

Outflows from the occupation

One aspect of the shortage of tool and die makers that cannot be assessed at this time is whether the uncertain response of wage rates has resulted in differentials that are too low to retain sufficient persons in the occupation (see Tables A.3 and A.17). There does appear to be a sizeable outflow from the occupation, but further research is necessary to determine how much of it results from a low wage differential and how much from other factors, such as fluctuations in employment or the conditions of work.

CONCLUSION

Responses to the shortage of tool and die makers have included overseas recruiting by large firms, training by smaller firms, and an increase in subcontracting of work from larger firms to small specialty shops. One can observe three types of market failures in the process of adjustment. The first is a low rate of apprentice completions - on average, only 50 per cent of those who entered apprenticeship in the 1970s. The second is a lack of major links between employers and community colleges in the development of programs to train tool and die makers. The third is the inability of domestic sources of supply to meet peak demands for tool and die makers.

This study uses statistics up to the end of 1980. On the basis of the historical data and the underlying supply and demand forces, I would expect a continuation of the pattern of shortage and then surplus of tool and die makers. The concluding chapter in this study offers suggestions designed to moderate the extremes in the fluctuations between shortage and surplus.

7
Policy proposals

Since imperfections are present in the labour market for tool and die makers, one can justify some sort of ameliorating intervention. But how far should corrective measures go? In seeking answers to this question, this chapter first considers what is likely to happen to the market if no such measures are taken. It then presents several policy proposals for easing the situation in the short or medium term. In conclusion, it suggests several ways of correcting present gaps in available data, analyses, or both, measures that could help economists and policy makers identify and perhaps correct incipient shortages of tool and die makers and other skilled labourers in the future.

A FORECAST IN THE ABSENCE OF NEW POLICIES

If no new policies are adopted in the next few years, what is likely to happen in the market for tool and die makers? Clearly, the answer must be tentative for it depends on what happens to both demand and supply.

For the demand side of the equation, let us assume that COFOR 85 occupational forecasting model developed by the Canadian Employment and Immigration Commission is correct in its estimate that Ontario will require 330 new tool and die makers per year during the first half of the 1980s.[1] Calculating the supply side then requires that we consider both how many immigrant tool and die makers will be admitted into Canada and how many apprentices will complete their training.

Let us assume that immigration will remain at the level of the past three years - that is, at an average of 176 tool and die makers admitted

1 This estimate for Ontario was obtained from unpublished data for COFOR 85 prepared by the Canada Employment and Immigration Commission.

each year - and that apprenticeship entrance and completion rates also hold at recent levels, producing 110 to 200 new journeymen per year. If these projections are accurate, there will be only a moderate shortfall of less than ten in 1981-2, with balance achieved and even surpassed by 1985 depending on the phase of the cycle of demand for tool and die makers.

Notice, however, that the COFOR estimates are long-run projections and do not reflect possible developments, such as the aircraft industry's receiving a large order (say, in connection with the building of the F-18A fighter) or the auto industry's heading into a major retooling. Clearly, any changes, upwards or downwards, from the projected demand would alter what now appears to be at most only a moderate shortage in the short run. So would changes in immigration or apprentice completions. But if demand follows expectations, if the number of immigrants remains stable, if the number of apprentice entrants holds at the recent high level, and if unanticipated outflow from the occupation holds at the 1960s' level, then, even with a 50 per cent apprentice completion rate, the shortage will be largely removed by the mid-1980s.

POLICY PROPOSALS

Despite this likelihood that the shortage of tool and die makers will gradually eliminate itself, the federal and provincial governments could undertake several policies to ameliorate the short-run situation and to ensure a better balance between supply and demand in the future. All can be justified by the presence of imperfections in the labour market.

1 Clearly, one market failure to overcome is the present low rate of apprenticeship completions. If that rate had been even 70 per cent for persons who entered the program in 1973-4, 1974-5, and 1975-6, by the end of 1980 Ontario would have had an additional 145 trained tool and die makers, enough to have filled all the vacancies then listed by Canada Employment Centres (see Table A.9).

Although the causes of the present 50 per cent drop-out rate demand additonal research, one specific recommendation can be made now. Since apprentices are among the first to be laid off when the demand for tool and die makers decreases, it seems certain that the occupation's cyclic character has contributed to the drop-out problem. Thus, some mechanism

should be created to enable apprentices to continue their training when they are laid off and to absorb the costs of their doing so.[2]

One way of doing this would be to permit Unemployment Insurance benefits to be combined with continued training (perhaps using firms' idle tool and die facilities). An alternative method would be to use work-sharing as a means of retaining both journeymen and apprentices during down swings (see Meltz, Reid, and Swartz 1981). (A job-sharing approach would also be useful during periods of peak demand when recently retired or about-to-retire persons could assist in training. Such a program would also help to alleviate the problem of an aging work force.)

A third approach to reducing drop-outs from apprenticeship - one that is being considered by the Canada Employment and Immigration Commission (CEIC) - would be to enable laid-off apprentices to continue their training in community colleges. Such a program would, of course, have to overcome employers' bias towards and the Union of Automobile Workers' contractual insistence on experience accumulated on the shop floor rather than in a school.

2 Two other policy proposals could assist in dealing with another market failure: the lack of coordination between employers of tool and die makers and the community colleges. First, firms must become more aware of their own needs, at least over the medium term. Some may require government assistance for (and, perhaps, insistence on) estimating their future manpower needs and relating these to possible market developments. Both the Ontario Manpower Commission and the CEIC are developing programs in this area. Second, ways must be found to communicate these needs to the groups involved in training. The manpower needs committees of CEIC are already working along these lines; their efforts should be strengthened and evaluated within an overall framework of meeting skill requirements.

3 Although the federal and provincial governments are beginning to develop specific programs to meet industry's requirements for skilled labour, they are encountering a fundamental problem in the legislation that underlies so much training in Canada. The federal Adult Occupational

2 Such a mechanism would have to distinguish between geniune cases of reduced demand and attempts to shift training towards government subsidies.

Training Act stipulates that financial assistance for skill training cannot exceed fifty-two weeks' duration (see Meltz 1974). Since training for occupations such as tool and die making requires much longer than fifty-two weeks, this limitation must be removed in order for there to be significant funding of apprenticeship training.[3]

4 Large firms' reluctance to provide training should be considered carefully. It may be that small shops provide an environment more conducive to training and that large employers can find ways of meeting their labour needs that are more efficient in the short term. Nonetheless, ways might be found to induce the large firms to bear their share of training costs.

One obstacle to large firms' providing training may be the fact that apprentices' wages are a percentage of journeymen's. The correlation of large size and high wages among employers of tool and die makers means that any large firm that takes on apprentices must pay them relatively high wages. Hence, one must ask whether the large firms would increase the amount of training they provide if they could pay apprentices at the same absolute rates as small firms do. (Such an approach would, of course, require changes in government regulations and, in most cases, changes in collective agreements with unions.)

5 Part of the credit for the recent increase in the number of tool and die making apprentices must go to the CEIC's new Critical Trades Skill Training Program (CTST) and the Ontario government's Employer Sponsored Training Program (EST) (Canada 1981b, chap. 9).[4] Such programs focus on industry associations' determining their needs with governmental funding over a period longer than fifty-two weeks. They are expensive; the CEIC estimates the cost at about $10,000 per trainee who completes a program.

One can raise the question of whether the government should be providing any financial support for this training. One justification for government involvement here are the elements of general education in the training (see Gunderson 1974). A further justification is that the prevailing shortage of skilled labour may be contributing to increasing costs

3 Employment and Immigration Canada's Task Force on Labour Market Development recommended that the fifty-two week limit be expanded to 104 weeks (Canada 1981b, 177).

4 Contracts signed by the CEIC with the Canadian Tooling Manufacturers' Association have specifically included tool and die makers.

and possibly curtailing production.

It seems, then, that programs such as CTST and EST should be continued. The extent to which they should be expanded depends on the involvement of industry in increasing the completion rate of apprentices and in coordinating their training programs with those of the colleges.

6 Although the number of immigrant tool and die makers has recently been reduced, it is likely that some firms will continue to want to recruit overseas for this skill. What level of immigration should be permitted and under what conditions?

The recommendation that appears most appropriate is placing the focus on the development of human resources in Canada, with a concomitant reduction in reliance on overseas recruiting. CEIC now requires employers who want to recruit workers from overseas to undertake to increase the amount of training they are doing. Although data are not available on the numbers of persons firms have agreed to train in return for permission to recruit overseas, the CEIC's present approach makes sense and should be strengthened.

It does not, however, appear necessary or even desirable to remove the possibility of firms' doing some recruiting overseas. Positive approaches to increasing both the retention of persons in training programs and the amount of consultation between industry and the schools, combined with a gradual reduction in the number of immigrants, should provide industry with a sufficient number of Canadian tool and die makers. If individual firms have agreed to increase training in return for permission to recruit overseas but do not follow through on these agreements, presumably their future access to overseas labour markets will be curtailed or removed.[5]

A legitimate question is whether firms that pay significantly less than the going rates should be permitted to recruit overseas. In these cases the 'shortage' of labour seems to be not real but simply the result of

5 An alternative would be to require firms to set aside the cost of training a number of tool and die makers equivalent to those being imported, with the money to be refunded on completion of the agreed amount of training. Such an approach is not recommended here since it does not seem necessary and would require a thorough consideration of the benefits and costs. This alternative also has elements of the levy/grant system that, as we shall see, caused some problems in the United Kingdom.

inadequate wages. Hence, in the absence of other considerations, such firms should not be allowed to recruit abroad.

7 Another consideration in regard to immigration relates to the structure of relative wages. We have seen that the wages of tool and die makers have not always responded as one might expect to changes in demand, a phenomenon that was attributed to the fact that tool and die makers generally belong to large bargaining units that have experienced a narrowing of skill differentials. But the pressure for wage increases has probably also been eased by two other factors: the addition to the market of large numbers of immigrants, and the reliance of low-paying firms on training rather than wage increases in times of labour shortages.

These facts suggest that a sudden, sharp reduction in immigration during a period of increasing demand would place upward pressure on relative wage rates. It would also increase the amount of training available - unless it curtailed production, an effect that could reduce the overall employment of tool and die makers. In any case, a sharp reduction in permitted immigration does not seem necessary or desirable.

8 A proposal under current consideration is the introduction of a levy/grant system to foster training. Various schemes are being examined (see Adams 1979, Canada [1981a], and Canada 1981b) but all involve the principle of increasing total investment in general or transferable skill training by having its costs borne collectively by all employers who use that skill rather than by a smaller number of individual employers. The mechanism used would be a levy imposed on all firms employing persons who have a given skill, with the funds redistributed to the firms that undertake training in it. In general, levy/grant schemes sound attractively equitable on paper, but it is worth remembering that such a system was tried in the United Kingdom and abandoned because, in the words of one observer, 'in practice its redistributive effects created other inequities even less acceptable to employers than the unequal sharing of training costs' (Canada 1981b, 224).

Given such experience elsewhere, one is reluctant to recommend the institution of a levy/grant system for the training of skilled manpower in Canada. Moreover, in the specific case of tool and die makers, such a system seems unnecessary. The preceding proposals, together with natural development of the market, should provide all the workers necessary unless demand undergoes a huge and unanticipated increase.

RECOMMENDATIONS CONCERNING DATA AND ANALYSIS

As we have seen, this study encountered a number of problems as a result of rather surprising gaps in the available date. Suggestions for correcting some of these are listed here along with comments on areas that need further analysis. Adopting some of the suggestions, it should be noted, would make possible more complete economic analysis of not only tool and die making but many other essential occupations in Ontario.

1 The absence of recent employment figures makes it difficult to determine the actual number of tool and die makers in Ontario, much less their age distribution or extent of training. Aside from census data, the only published figures are those in the Occupational Employment Survey, which has now been discontinued and whose reliability has been questioned (Canada 1979a).

Since employment figures are necessary both for understanding the current situation and for providing a base on which to estimate future requirements, consideration should be given to developing some instrument that can provide employment data as well as other missing variables, such as vacancies, turnover, and earnings (see Newton, Betcherman, and Meltz 1981, and Meltz in press).

2 Another problem with the data is the fact that the codes used by the Canadian Classification and Dictionary of Occupations (CCDO) (Canada 1971a) do not distinguish between trained and untrained persons. Code 8311, for example, includes both journeyman and apprentice tool and die makers. Complicating matters further, Canada Employment Centres (CECs) allocate these codes to persons who have an interest but no experience in the occupations they designate. Thus, a person listed under Code 8311 with a CEC may be a fully trained tool and die maker, a person with partial training, or simply someone who has expressed an interest in entering apprenticeship.

To overcome this problem, CECs should consider using a supplementary code to distinguish experienced from inexperienced persons. For the CCDO as a whole, the authorities would do well to see whether they can devise some classification system that would maintain the historical comparability of data but simultaneously enable analysts to distinguish persons by level of training.

3 Understanding the cost of training is so central to the analysis of a skill shortage that it merits a separate study. Are there economies of scale in apprenticeship training? Are certain sizes and types of firms more adept at training? Could some training functions be more integrated with the community college system? It is almost ten years since the Dymond Committee (Ontario 1973) examined the training of skilled labour in the province; now seems an appropriate time to reexamine the focus and locus of apprenticeship training.

4 The growth of specialized tool and die shops and the increase in subcontracting appear to amount to a restructuring of tool and die work. This apparently positive development is something to be considered in formulating policies to increase skill training for the field. A fuller examination of the extent, location, and impact of subcontracting could provide useful information for planning future training programs.

5 The dominant factor in the swings between shortages and surpluses of tool and die makers has been the fluctuations of demand in manufacturing, particularly the automobile and aircraft sectors. Although the move towards speciality tool and die firms may moderate these fluctuations somewhat, consideration should be given to additional means of smoothing the sharp swings in demand. An increase in manpower planning might be one step in this direction.

CONCLUSION

This study has attempted to demonstrate the necessity of examining the functioning of a particular labour market. While it demonstrated that excess demand for tool and die makers existed in the late 1970s, it also showed that not all firms experienced a shortage of (that is, an inability to hire) these labourers. The no-shortage firms were large, high-wage establishments, which could use their labour market position to attract workers or to recruit overseas. Smaller, lower-paying shops faced hiring difficulties even though one of their responses to the shortage was to increase their training of new workers. These differences in response to labour market difficulties underline the importance of assessing the market situation before prescribing government policy solutions.

In other words, this study has shown that a detailed examination of a

market experiencing a labour shortage (or surplus) can provide insights into the extent and sources of the problem as well as possible solutions. Moreover, it may demonstrate that the occupational data now available in Canada, imperfect though they are, can be revealing. One hopes that such research will continue since a labour market focus is essential for diagnosing manpower and training needs.

APPENDIX A
Statistical Appendix

TABLE A.1
Tool and die makers in the labour force (Canada, 1931-71)

	1931	1941	1951	1961	1971
In Canada	2 851	7 049	9 443	10 606	10 310
In Ontario	2 507	5 863	7 577	8 330	8 200
As % of all Canada	87.9	83.2	80.1	78.2	79.5
In manufacturing (all Canada)	2 789	6 957	9 151	10 168	9 570
As % of all Canada	97.8	98.7	96.8	95.4	92.8
In major subsectors					
Iron and steel products, electrical apparatus and supplies[a]	1 742	4 526	5 907	6 315	
Transportation equipment	859	1 923	2 449	2 680	2 405
Metal fabricating[b]					3 805
Machinery, except electrical[b]					945
Electrical products[b]					1 000
Miscellaneous[a]	33	173	340	654	
Total in major subsectors	2 634	6 622	8 696	9 649	8 155
As % of all manufacturing	94.4	95.2	95.0	94.9	85.2

a Based on industrial classifications of 1951 census.
b Classifications for 1971 census.
SOURCES: For 1931-61: Meltz (1969); for 1971: Canada [1976]

TABLE A.2
Location of tool and die makers (Ontario, 1961-71)

	1961		1971	
	Number in labour force	% of total	Number in labour force	% of total
All Ontario	8 330	100.0	8 200	100.0
Toronto	2 752	33.0	3 175	38.7
Windsor	1 256	15.1	1 025	12.5
Hamilton	687	8.2	515	6.3
Kitchener/Waterloo	423	5.1	320	3.9
Oshawa	418	5.0	415	5.1
St. Catharines	333	4.0	510	6.2
London	188	2.3	280	3.4
Peterborough	165	2.0	140	1.7
Brantford	152	1.8	125	1.5
Ottawa	98	1.2	80	1.0
Galt	79	0.9	75	0.9
Chatham	72	0.9	105	1.3
Guelph	71	0.9	60	0.7
Burlington	57	0.7	80	1.0
Kingston	52	0.6	35	0.4
Welland	50	0.6	75	0.9
Belleville	34	0.4	10	0.1
Brampton	32	0.4	90	1.1
Sarnia	30	0.4	35	0.4
Barrie	24	0.3	20	0.2
Oakville	21	0.3	65	0.8
Total in major areas	6994	84.0	7235	88.2

NOTE: Small discrepancies in the percentages are caused by rounding.
SOURCES: For 1961: Census of Canada, Statistics Canada, Cat. 94-504 (Bulletins 3.1-4), 94-505 (Bulletin 3.1-5), and 94-506 (Bulletin 3.1-6); for 1971: Census of Canada, Statistics Canada, Cat. 94-719 (Bulletin 3.2-5), 94-720 (Bulletin 3.2-6), and 94-721 (Bulletin 3.2-7)

TABLE A.3
Hourly wage rates in manufacturing industries (selected Ontario cities, 1961-77)

	Occupation	Hamilton	St. Catharines	Toronto	Windsor
1961	General labourers	$1.81	$1.82	$1.59	$1.97
	Tool and die makers	2.49	2.57	2.35	2.58
	Differential	138%	141%	148%	131%
1962	General labourers	$1.92	$1.85	$1.65	$2.01
	Tool and die makers	2.54	2.64	2.47	2.62
	Differential	132%	143%	150%	130%
1963	General labourers	$1.93	$1.98	$1.69	$2.05
	Tool and die makers	2.58	2.69	2.59	2.70
	Differential	134%	136%	153%	132%
1964	General labourers	$1.99	$2.06	$1.74	$2.18
	Tool and die makers	2.76	2.86	2.70	2.81
	Differential	139%	139%	155%	129%
1965	General labourers	$2.11	$2.20	$1.85	$2.37
	Tool and die makers	2.84	3.02	2.89	3.08
	Differential	135%	137%	156%	130%
1966	General labourers	$2.21	$2.30	$1.98	$2.55
	Tool and die makers	3.02	3.25	3.07	3.23
	Differential	137%	141%	155%	127%
1967	General labourers	$2.29	$2.46	$2.08	$2.56
	Tool and die makers	3.17	3.37	3.23	3.36
	Differential	138%	137%	155%	131%
1968	General labourers	$2.44	$2.67	$2.25	$2.70
	Tool and die makers	3.44	3.79	3.50	3.73
	Differential	141%	142%	156%	138%
1969	General labourers	$2.63	$2.79	$2.44	$3.01
	Tool and die makers	3.63	4.11	3.94	3.93
	Differential	138%	147%	161%	131%
1970	General labourers	$3.06	$3.04	$2.61	$3.37
	Tool and die makers	3.91	4.37	4.05	3.97
	Differential	128%	144%	155%	118%
1971	General labourers	$3.23	$3.29	$2.87	$3.60
	Tool and die makers	4.26	4.62	4.33	4.35
	Differential	132%	140%	151%	121%
1972	General labourers	$3.61	$3.66	$3.09	$3.83
	Tool and die makers	4.58	5.38	4.61	4.76
	Differential	127%	147%	149%	124%
1973	General labourers	$3.82	$4.03	$3.38	$4.03
	Tool and die makers	5.10	5.66	4.97	5.69
	Differential	134%	140%	147%	141%
1974	General labourers	$4.28	$4.32	$3.82	$4.94
	Tool and die makers	5.67	6.43	5.80	6.34
	Differential	132%	149%	152%	128%

TABLE A.3 (continued)

	Occupation	Hamilton	St. Catharines	Toronto	Windsor
1975	General Labourers	$5.15	$4.47	$4.40	$5.43
	Tool and die makers	6.46	6.28	6.40	7.14
	Differential	125%	140%	145%	131%
1976	General labourers	$5.59	$5.41	$4.76	$5.85
	Tool and die makers	6.99	7.26	6.97	7.66
	Differential	125%	134%	146%	131%
1977	General labourers	$6.32	$.23	$5.32	$6.61
	Tool and die makers	7.73	8.79	7.75	8.62
	Differential	122%	141%	146%	130%
1978	General labourers	$6.67	$6.73	$5.64	$7.18
	Tool and die makers	8.21	8.92	8.47	9.19
	Differential	123%	133%	150%	128%
1979	General labourers	$7.35	$7.40	$6.27	$7.86
	Tool and die makers	8.89	10.34	9.36	9.91
	Differential	121%	140%	149%	126%

SOURCE: Canada (1961-79)

TABLE A.4
Foregone earnings and increases in income through apprenticeship training in tool and die making: illustrations in current dollars

	Tool and die journeyman[a]	General labourer	Tool and die apprentice		Apprentice's earnings less labourer's
			Amount	% of Journeyman's[c]	
Toronto					
Year 1	$20 000	$13 333	$10 500	52.5%	$-2 833
Year 2	20 000	13 333	12 500	62.5	- 833
Year 3	20 000	13 333	14 500	72.5	+1 167
Year 4	20 000	13 333	16 500	82.5	+3 167
Difference in lifetime earnings: $668 + (40 x $6 667) = $267 348					
Windsor					
Year 1	$22 000	$16 923	$11 550	52.5	$-5 373
Year 2	22 000	16 923	13 750	62.5	-3 173
Year 3	22 000	16 923	15 950	72.5	- 973
Year 4	22 000	16 923	18 150	82.5	+1 227
Difference in lifetime earnings: $8 292 + (40 x $5 077) = $203 080					

a For Toronto, a journeyman was assumed to make $10 per hour for 2 000 hours per year; the rate for Windsor was assumed to be 10 per cent higher (see Table A.3).
b Labourers' wages were assumed to be two-thirds of the tool and die journeymen's in Toronto and 10/13ths in Windsor. These calculations are based on recent figures shows in Table A.3.
c Ontario regulations set an apprentice's wages as an increasing percentage of the employer's journeyman's rate (see Chapter 2).

TABLE A.5
Age distribution of tool and die makers, (Ontario, 1931-71)

Age	1931		1941		1951		1961		1971	
	Number	%	Number	%	Number	%	Number	%	Number	%
14-19	33	1.3	776	13.2	292	3.9	159[a]	1.9[a]	180[a]	2.2
20-24	277	11.0	1050	17.9	878	11.6	790	9.5	1115	13.6
25-34	731	29.1	1331	22.7	2595	34.2	2391	28.7	2310	28.2
35-44	786	31.3	1119	19.1	1713	22.6	2580	31.0	1910	23.3
45-54	494	19.8	934	15.9	1089	14.4	1400	16.8	1680	20.5
55-64	152	6.1	534	9.1	707	9.3	827	9.9	850	10.4
65 +	34	1.4	119	2.1	303	4.0	183	2.2	150	1.8
TOTAL	2507	100.0	5863	100.0	7577	100.0	8330	100.0	8200	100.0

NOTES: Percentages may not add to totals because of rounding in original sources.
a Data for 1961 and 1971 is for ages 15-19.
SOURCES: For 1931: Census of Canada 7, Table 40; for 1941: Census of Canada 7 Table 5; for 1951: Census of Canada 4, Table 11; for 1961: Census of Canada, Statistics Canada, Cat. 94-511, Table 17; for 1971: Census of Canada, Statistics Canada Cat. 94-725, Table 8.

TABLE A.6
Immigrant tool and die makers: birthplace and time of entrance (Canada, 1931-71)

	Total number	Birthplace					Period of immigration								
		Canada	U.K.	U.S.	Europe	Asia	All Periods	Before 1911	1911-20	1921-31	1931-41	1941-5	1946-51	1951-60	1961-71
1931	2 851	1 235	1 216	116	265	3	1 619	541	481	597					
	% of total	43.3	42.6	4.1	9.3	0.1									
1941	7 049	4 565	1 653	195	628	5	2 733	594	716	1 194	223				
	% of total	64.8	23.4	2.8	8.9										
1951	9 443	6 393	1 709	200	1 103	5	3 050	Before 1921		1 122	194	59	721[a]		
	% of total	67.7	18.1	2.1	11.7	0.1		954							
1961	10 606	5 476	1 587	130	3 352	11	5 130	Before 1946					1946-61		
	% of total	51.6	15.0	1.2	31.6	0.1		1 317					3 813		
1971	10 310	4 790	1 400	76	3 800	120	5 520	Before 1946					320[b]	2 365	2 315
	% of total	46.5	13.6	0.7	36.9	1.2		510							

NOTES: Numbers may not add to totals because of rounding in original sources.
a Five months only of 1951.
b 1946-50.
c Incluces British possessions.
SOURCES: 1931 Census of Canada 7, Tables 44-5; 1941 Census of Canada 7, Table 12; 1951 Census of Canada 4, Table 12; 1961 Census of Canada, Statistics Canada, Cat. 94-515; 1971 Census of Canada, Statistics Canada, Cat. 94-734.

TABLE A.7
Apprentice registrations for tool and die makers (Ontario, 1960-80)

Year of registration[a]	Registered[b]	Cancelled	Completed	Completion rate	Still active[c]
1960-1	20	3	17	85%	
1961-2	27	3	24	89	
1962-3	88	14	74	84	
1963-4	119	22	97	82	
1964-5	400	69	331	83	
1965-6	277	48	229	83%	
1966-7	458	97	361	79	
1967-8	258	80	278	69	
1968-9	234	70	164	70	
1969-70	365	103	262	72	
1970-1	224	116	108	48%	
1971-2	163	79	84	51	
1972-3	207	108	99	48	
1973-4	310	167	135	44[d]	8
1974-5	258	110	135	52[d]	13
1975-6	158	50	79		29
1976-7	218	68	61		89
1977-8	290	83	13		194
1978-9					
Code 239A[e] 116					
Code 430A[e] 352					
Year's total[f]	468	42	2		424
1979-80[f]	500	40			460
Totals	5042	1372	2453		1217

a Fiscal year, April 1 to March 31.
b Registered in the nonregulated tool and die maker trade (Code 239A) from 1960-1 though 1977-8, in the regulated (certified) tool and die maker trade (Code 430A) in 1979-80, and in both categories in 1978-9.
c As of March 7, 1980.
d Excludes persons still active as apprentices on March 7, 1980.
e For administrative reasons, the ministry listed apprentices in two categories in its data for 1978-9, the year following the switch to required registration of apprentices.
f To March 7, 1980.
SOURCE: Information provided by the Ontario Ministry of Colleges and Universities, Apprenticeship Branch.

TABLE A.8
Additions to tool and die making journeymen (Ontario, 1968-79)

	Landed immigrants	Apprentice completions[a]	Total
1968	444	331	775
1969	347	229	576
1970	286	361	647
1971	174	278	452
1972	142	164	306
1973	199	262	461
1974	281	108	389
1975	155	84	239
1976	86	99[b]	185
1977	152	135[c]	287
1978	162	135[d]	297
1979	214	79	293
Total 1968-79	2 642	2 265	4 907

a The number of apprentice completions is approximate since it assumes that each completed the program four years after the year of registration.
b As of March 7, 1980, 8 were still active.
c As of March 7, 1980, 13 were still active.
d As of March 7, 1980, 29 were still active.
SOURCE: Information provided by Canada Employment and Immigration Commission, and Table A.7.

TABLE A.9
Gross vacancies for tool and die makers (Ontario, 1968-80): CEC and JVS data

	Job Vacancy Survey		Canada Employment Centres	
	Number	% of labour force	Number	% of labour force
1968 3rd Q			58	0.7
4th Q			78	1.0
1969 1st Q			136	1.7
2nd Q			233	2.9
3rd Q			255	3.1
4th Q			151	1.8
Annual average			194	2.4
1970 1st Q			120	1.5
2nd Q			86	1.1
3rd Q			91	1.1
4th Q			32	0.4
Annual average			82	1.0
1971 1st Q	72	0.9	36	0.4
2nd Q	46	0.6	43	0.5
3rd Q	28	0.3	45	0.6
4th Q	47	0.6	36	0.4
Annual average	48	0.6	40	0.5
1972 1st Q	193	2.4	60	0.7
2nd Q	230	2.8	78	1.0
3rd Q	66	0.8	87	1.1
4th Q	532	6.5	89	1.1
Annual average	255	3.1	79	1.0
1973 1st Q	263	3.2	109	1.3
2nd Q	342	4.2	140	1.7
3rd Q	509	6.2	167	2.0
4th Q	218	2.7	213	2.6
Annual average	333	4.1	157	1.9
1974 1st Q	372	4.6	215	2.6
2nd Q	356	4.4	209	2.6
3rd Q	427	5.2	184	2.3
4th Q	174	2.1	97	1.2
Annual average	332	4.1	176	2.2
1975 1st Q	20	0.2	39	0.5
2nd Q	59	0.7	38	0.5
3rd Q	56	0.7	42	0.5
4th Q	58	0.7	53	0.6
Annual average	48	0.6	43	0.5
1976 1st Q	199	2.4	81	1.0
2nd Q	144	1.8	90	1.1
3rd Q	132	1.6	110	1.3
4th Q	89	1.1	111	1.4
Annual average	141	1.7	98	1.2

TABLE A.9 (continued)

	Job Vacancy Survey		Canada Employment Centres	
	Number	% of labour force	Number	% of labour force
1977 1st Q	161	2.0	113	1.4
2nd Q	129	1.6	121	1.5
3rd Q	80	1.0	139	1.7
4th Q	368	4.5	146	1.8
Annual average	185	2.2	130	1.6
1978 1st Q	383	4.7	165	2.0
2nd Q	462	5.7	185	2.3
3rd Q	200	2.4	220	2.7
4th Q	414	5.1	231	2.8
Annual average	365	4.5	200	2.4
1979 1st Q			228	2.8
2nd Q			227	2.8
3rd Q			218	2.7
4th Q			208	2.5
Annual average			220	2.7
1980 1st Q			206	2.5
2nd Q			181	2.2
3rd Q			128[b]	1.6
4th Q			131	1.6
Annual average			162	2.0

a Vacancy and unemployment rates were calculated using a labour force figure for tool and die makers of 8171. This figure is the average of Statistics Canada estimates for 1971 and 1975 (see Table A.11); until the 1981 census data are published, these are the most recent figures we have.
b July and August only. Complete figures are not available for September because of a strike by clerical workers in the federal public service.
SOURCES: For Job Vacancy Survey: Statistics Canada, special tabulations; for Canada Employment Centres, form MAN-757.

TABLE A.10
Unemployment among tool and die makers (Ontario 1968-80); CEC and UI Data

Quarter	Canada Employment Centre listings		Unemployment Insurance claimants	
	Number	% of labour force[a]	Number	% of labour force[a]
1968 3rd Q	310	3.8		
4th Q	228	2.8		
1969 1st Q	157	1.9		
2nd Q	132	1.6		
3rd Q	145	1.8		
4th Q	163	2.0		
Annual average	149	1.8		
1970 1st Q	203	2.5		
2nd Q	345	4.2		
3rd Q	399	4.9		
4th Q	631	7.7		
Annual average	395	4.8		
1971 1st Q	520	6.4		
2nd Q	460	5.6		
3rd Q	484	5.9		
4th Q	502	6.1		
Annual average	492	6.0		
1972 1st Q	279	3.4		
2nd Q	255	3.1		
3rd Q	266	3.3		
4th Q	225	2.8		
Annual average	256	3.1		
1973 1st Q	151	1.8		
2nd Q	142	1.7		
3rd Q	126	1.5		
4th Q	131	1.6		
Annual average	138	1.7		
1974 1st Q	161	2.0	270	3.3
2nd Q	185	2.3	182	2.2
3rd Q	190	2.3	193	2.4
4th Q	288	3.5	312	3.8
Annual average	206	2.5	239	2.9
1975 1st Q	556	6.8	746	9.1
2nd Q	603	7.4	632	7.7
3rd Q	635	7.8	495	6.1
4th Q	375	4.6	380	4.7
Annual average	542	6.6	563	6.9
1976 1st Q	299	3.7	236	2.9
2nd Q	313	3.8	190	2.3
3rd Q	267	3.3	177	2.2
4th Q	228	2.8	185	2.3
Annual average	277	3.4	197	2.4

TABLE A.10 (continued)

Quarter	Canada Employment Centre listings		Unemployment Insurance claimants	
	Number	% of labour force[a]	Number	% of labour force[a]
1977 1st Q	232	2.8	214	2.6
2nd Q	220	2.7	161	2.0
3rd Q	257	3.1	177	2.2
4th Q	228	2.8	153	1.9
Annual average	234	2.9	176	2.2
1978 1st Q	194	2.4	188	2.3
2nd Q	166	2.0	134	1.6
3rd Q	192	2.3	114	1.4
4th Q	197	2.4	124	1.5
Annual average	187	2.3	140	1.7
1979 1st Q	198	2.4	117	1.4
2nd Q	224	2.7	133	1.6
3rd Q	256	3.1	184	2.3
4th Q	255	3.1		
Annual average	233	2.9		
1980 1st Q	351	4.3		
2nd Q	502	6.1		
3rd Q	648[c]	7.9		
4th Q	645	7.9		
Annual average	537	6.6		

a See Table A.9, note a.
b These data, which were taken from the CEIC's administrative records, are simply a count of the number of 'active' files in its claims offices at a given point in time, excluding claim;s for sickness, maternity, retirement, and fishing; from the third quarter of 1978, they also exclude persons enrolled in training programs.
c See Table A.9, note b.
SOURCES: For Canada Employment Centres, form MAN-757; for Unemployment Insurance claimants, information provided by the Canada Employment and Immigration Commission.

TABLE A.11
Unemployment among tool and die makers (Ontario 1951-75): census data

	1951	1961	1971	1975
Total	7 577	8 330	8 200	8 142
Employed	7 562	8 206	7 665	7 600
Unemployed	15	124	535	542
Unemployment rate	0.2%	1.5%	6.5%	6.7%

SOURCES: For 1951: Census of Canada 5, Table 10 and 4, Table 11; for 1961: Census of Canada, Series 3.3, (bulletin 3.3-13) Table 37, and Series 3.1 (bulletin 3.1-3) Table 6; for 1971, Census of Canada 3, part 7, Statistics Canada, Cat. 94-781 (bulletin 3.7-11) and 3, part 7, Cat. 94-782 (bulletin 3.7-12); for 1975: (Canada 1975b, and 1975c).

TABLE A.12
Net vacancies for tool and die makers (selected Ontario cities, 1968-80), calculated with CEC vacancy and unemployment data

(U = number unemployed; V = gross vacancies)

	Ontario			Hamilton			Toronto			Windsor		
	U	V	V - U	U	V	V - U	U	V	V - U	U	V	V - U
1968 3rd Q	310	58	-252									
4th Q	228	78	-150									
1969 1st Q	157	136	- 21									
2nd Q	132	233	+101									
3rd Q	145	255	+110									
4th Q	163	151	- 12									
1970 1st Q	203	120	- 83									
2nd Q	345	86	-259									
3rd Q	399	91	-308									
4th Q	631	32	-599									
1971 1st Q	520	36	-484									
2nd Q	460	43	-417									
3rd Q	484	45	-439									
4th Q	502	36	-466									
1972 1st Q	279	60	-219	27	4	-23	107	28	-78	36	3	-33
2nd Q	255	78	-177	23	3	-20	102	31	-71	32	12	-20
3rd Q	266	87	-179	19	8	-11	102	30	-72	49	8	-41
4th Q	225	89	-136	18	4	-14	87	31	-56	53	7	-46
1973 1st Q	151	109	- 42	17	5	-12	64	45	-19	20	17	- 3
2nd Q	142	140	- 2	13	9	- 4	43	54	+11	40	14	-26
3rd Q	126	167	+ 41	13	12	- 1	39	68	+29	26	27	+ 1
4th Q	131	213	+ 82	9	14	+ 5	40	98	+58	29	25	- 4
1974 1st Q	161	215	+ 54	13	11	- 2	44	101	+57	39	23	-16
2nd Q	185	209	+ 24	14	14		60	84	+24	49	17	-32
3rd Q	190	184	- 6	7	11	+ 4	89	70	-19	33	19	-14
4th Q	288	97	-191	8	6	- 2	115	32	-83	62	6	-56
1975 1st Q	556	39	-517	9	2	- 7	155	19	-136	192		-192
2nd Q	603	38	-565	13	1	-12	124	15	-109	278	1	-277
3rd Q	635	42	-593	21	2	-19	139	14	-125	303	1	-302
4th Q	375	53	-322	12	2	-10	131	17	-114	101	2	- 99
1976 1st Q	299	81	-218	10	5	- 5	99	17	- 82	82	11	- 71
2nd Q	313	90	-223	15	9	- 6	108	22	- 86	84	12	- 72
3rd Q	267	110	-157	14	5	- 9	109	30	- 79	55	14	- 41
4th Q	228	111	-117	19	5	-14	90	18	- 72	30	25	- 5
1977 1st Q	232	113	-119	14	8	- 6	94	17	- 77	14	24	+ 10
2nd Q	220	121	- 99	9	3	- 6	79	28	- 51	24	28	+ 4
3rd Q	257	139	-118	7	4	- 3	102	35	- 67	20	37	+ 17
4th Q	228	146	- 82	7	6	- 1	81	42	- 39	12	39	+ 27

TABLE A.12 (continued)

Quarter	Ontario			Hamilton			Toronto			Windsor		
	U	V	V - U	U	V	V - U	U	V	V - U	U	V	V - U
1978 1st Q	194	165	- 29	10	7	- 3	69	55	- 14	24	43	+ 19
2nd Q	166	185	+ 19	14	5	- 9	47	64	+17	26	28	+ 2
3rd Q	192	220	+ 28	13	9	- 4	50	76	+ 26	30	29	- 1
4th Q	197	231	+ 34	9	10	+ 1	62	82	+ 20	23	35	+ 12
1979 1st Q	198	228	+ 30	10	12	+ 2	49	74	+ 25	35	33	- 2
2nd Q	224	227	+ 3	9	11	+ 2	63	81	+ 18	45	30	- 15
3rd Q	256	218	- 38	8	9	+ 1	64	73	+ 9	63	27	- 36
4th Q	255	208	- 47	7	13	+ 5	44	76	+ 32	82	27	- 55
1980 1st Q	351	206	-145									
2nd Q	502	181	-321									
3rd Q[a]	648	128	-520									
4th Q	645	131	-514									

a See Table A.9, note b.

SOURCES: For vacancies, see Table A.9 (CEC data); for unemployed, see Table A.10 (CEC data).

TABLE A.13
Net vacancies for tool and die makers (Ontario 1971-8) calculated with JVS vacancy data and CEC unemployment data
(U = number unemployed; V = gross vacancies)

	U	V	V - U
1971 1st Q	520	72	-448
2nd Q	460	46	-414
3rd Q	484	28	-456
4th Q	502	47	-455
1972 1st Q	279	193	- 86
2nd Q	255	230	- 25
3rd Q	266	66	-200
4th Q	225	532	+307
1973 1st Q	151	263	+112
2nd Q	142	342	+200
3rd Q	126	509	+383
4th Q	131	218	+ 87
1974 1st Q	161	372	+211
2nd Q	185	356	+171
3rd Q	190	427	-237
4th Q	288	174	-114
1975 1st Q	556	20	-536
2nd Q	603	59	-544
3rd Q	635	56	-579
4th Q	375	58	-317
1976 1st Q	299	199	-100
2nd Q	313	144	-169
3rd Q	267	132	-135
4th Q	228	89	-139
1977 1st Q	232	161	- 71
2nd Q	220	129	- 91
3rd Q	257	80	-177
4th Q	228	368	+140
1978 1st Q	194	383	+189
2nd Q	166	462	+296
3rd Q	192	200	+ 8
4th Q	197	414	+217

SOURCES: For vacancies, see Table A.9 (JVS data); for unemployed, see Table A. 10 (CEC data).

TABLE A.14
Tool and die makers' hiring wage rates compared with other occupations' (Ontario, 1971-7)

	TOOL AND DIE MAKERS					
	No. of Vacancies	No. of Unemployed	Net Vacancies	Starting Wage rate (hourly) Tool & die	Starting Wage rate (hourly) All occupations	Tool and die as a ratio of All occupations
1971	a	492	a	a	$2.60	a
1972	310	256	54	$3.70	2.60	1.42
1973	410	138	272	4.20	3.00	1.40
1974	370	206	164	4.80	3.50	1.37
1975	a	542	a	a	4.10	a
1976	150	277	-127	6.10	4.70	1.30
1977	200	234	-34	7.10	4.95	1.43

a Rates not calculated for any year in which there were less than one hundred vacancies.
SOURCE: Unpublished data from the Job Vacancy Survey, provided by Statistics Canada, Labour Division.

TABLE A.15
Quarterly employment indexes for major manufacturing subsectors that use tool and die makers (Ontario, 1968-79)

	Metal fabricating	Machinery, except electrical	Transportation equipment	Electrical products
1968 1st Q	128.6	142.1	153.5	140.8
2nd Q	131.4	129.4	165.6	139.9
3rd Q	133.8	141.5	147.9	140.2
4th Q	136.7	137.3	167.9	143.4
1969 1st Q	136.5	145.5	168.2	145.2
2nd Q	141.0	148.5	170.2	150.9
3rd Q	139.5	150.9	159.1	153.1
4th Q	141.6	153.5	168.3	152.8
1970 1st Q	138.8	151.6	158.6	149.2
2nd Q	138.7	146.7	157.5	145.1
3rd Q	138.4	144.1	158.1	144.3
4th Q	135.7	147.2	139.8	139.3
1971 1st Q	132.2	147.4	159.9	133.2
2nd Q	134.0	145.8	162.7	133.6
3rd Q	133.3	137.5	154.7	133.1
4th Q	134.8	141.9	161.9	136.2
1972 1st Q	131.6	146.9	167.6	135.4
2nd Q	135.8	148.7	170.5	135.6
3rd Q	137.0	147.3	163.5	139.4
4th Q	138.1	137.6	177.4	144.6
1973 1st Q	138.1	149.4	179.3	145.6
2nd Q	145.2	157.2	185.7	141.7
3rd Q	145.2	159.3	186.1	150.9
4th Q	147.4	165.2	186.6	155.1
1974 1st Q	146.9	163.4	182.4	154.0
2nd Q	151.1	167.7	181.3	161.4
3rd Q	150.3	166.3	179.3	163.8
4th Q	148.6	168.6	178.5	163.4
1975 1st Q	139.7	169.3	154.6	149.9
2nd Q	139.6	162.7	165.0	142.4
3rd Q	136.2	153.7	165.8	142.5
4th Q	139.9	157.1	164.4	146.0
1976 1st Q	139.4	163.2	170.7	145.3
2nd Q	141.5	159.1	176.1	143.3
3rd Q	140.3	152.8	170.8	143.0
4th Q	140.5	157.9	177.4	140.0
1977 1st Q	136.5	156.2	178.2	133.6
2nd Q	136.4	152.6	184.6	134.1
3rd Q	137.3	153.1	182.1	132.7
4th Q	136.0	150.9	191.1	130.2
1978 1st Q	134.0	150.1	187.9	128.6
2nd Q	136.4	152.0	193.6	129.8
3rd Q	138.4	149.6	191.1	131.5
4th Q	142.4	154.2	198.5	136.8

TABLE A.15 (continued)

	Metal fabricating	Machinery, except electrical	Transportation equipment	Electrical products
1979 1st Q	145.3	156.3	199.7	134.8
2nd Q	146.8	160.8	201.3	139.7
3rd Q	145.9	163.3	195.0	142.9
4th Q	144.6	165.8	186.4	143.2

SOURCE: Canada (1968-79)

TABLE A.16
Changes in employment indexes in industries of major manufacturing subsectors that use tool and die makers (Ontario, 1969-71 and 1973-5)

	Total	Metal fabricating	Machinery except electrical	Transportation equipment	Electrical products
Number of tool and die makers in 1971[a]	6483	3025	751	1912	795
% of total[a]	100.0	46.7	11.6	29.5	12.3
% of industry labour force[b]	0.6	2.8	1.2	1.5	0.9
Change in employment indexes, 1971-5 (2nd quarters)					
Index change		5.6	16.9	2.3	8.8
Change as % of 1971	4.5[c]	4.2	11.6	1.4	6.6
1969-71					
Peak index		141.6 Q4'69	153.5 Q4'69	170.2 Q2'69	153.1 Q3'69
Trough index		132.2 Q1'71	137.5 Q3'71	139.8 Q4'70	133.1 Q3'71
Peak Less trough:					
Index		9.4	16.0	30.4	20
Index as % of peak		6.6	10.4	17.9	13.1
Estimated impact on tool and die makers[d]	724	200	78	342	104
1973-5					
Peak index		151.1 Q2'74	169.3 Q1'75	186.6 Q4'73	163.8 Q3'74
Trough index		136.2 Q3'75	153.7 Q3'75	154.6 Q1'75	142.4 Q2'75
Peak less trough:					
Index		14.9	15.6	32.0	21.4
Index as % of peak		9.9	9.2	17.1	13.1
Estimated impact on tool and die makers[d]	799	299	69	327	104

a Calculated from Table A.1 by assuming that each industry in Ontario has the same percentage of the total as does all Canada.
b See Canada (1976); percentages are for all Canada.
c Percentage change weighted by number of tool and die makers.
d Calculated by multiplying the decrease as a percentage of the peak times the number of tool and die makers in each subsector in 1971.
SOURCE: Tables A.1 and A.15.

TABLE A.17
Inflows to and estimated outflows from tool and die making (Ontario, 1961-71)

Actual 1961[a]			8 330
Inflows			
Immigration[b]		1 621	
Completed apprenticeships[c]		1 175	
Net increase of persons in apprenticeships[d]		346	3 142
Gross supply			11 472
Less actual 1971[a]			8 200
Outflow 1961-71			3 272
As % of gross	28.5%		
As % of 1961 base	39.3%		

Less anticipated attrition 1961-71

	Number in 1961	10-year attrition rate (estimated)[e]	Anticipated attrition	
Males				
Age 14-19	158	1.3%	2	
Age 20-24	784	2.0	16	
Age 25-34	2 379	2.5	59	
Age 35-44	2 570	7.4	190	
Age 45-54	1 398	19.8	277	
Age 55 +	1 009	73.8	745	
Females				
Age 14-44	29	2.0	1	
Age 45-54	2	10.1	0	
Age 55 +	1	59.4	1	
Total anticipated attrition				1 291
As % of total outflow		39.5		
As % of 1961 base		15.5		
Unanticipated outflow				1 981
As % of total outflow		60.5		
As % of 1961 base		23.8		

a See Table A.11.
b 70 per cent of the tool and die makers who entered Canada as landed immigrants, 1961-71 (see Table 6). The figure of 70 per cent was the percentage of immigrant tool and die makers who entered Canada in 1970 and intended to reside in Ontario.
c Figure provided by the Ontario Ministry of Colleges and Universities.
d See Table A.5 (calculated as the difference between the numbers of persons ages 15-24 in 1961 and in 1971).
e See Meltz and Penz (1968, 41). Since those rates were to 1970, they have been multiplied by 10/9 to convert them to estimated rates of deaths and retirements to 1971.

APPENDIX B

The interview format of the tool and die maker study

Name of firm _____ Date of interview _____

Address _____

Telephone _____ Persons Interviewed _____

Position _____

1. THE CURRENT SITUATION

a Number of tool and die makers currently employed: _____

Journeymen? _____ Apprentices? _____

b Have there been sizeable fluctuations in tool and die maker employment since 1970?

Yes _____ No _____ Numbers involved _____

c Number of vacancies for which recruits are being sought _____

d Reasons for difficulty in recruiting: _____

2. QUALIFICATIONS

a Minimum acceptable years of: schooling _____

specialized skill training _____ on the job experience _____

b Average hiring wage rates: _____ per hour.

c Can tool and die makers easily transfer to this industry from another (e.g., aircraft to automobiles)?

Yes _____ No _____

Comments: _____

3. TURNOVER OF JOURNEYMEN

a The number of tool and die makers hired in the past year is _____.

b The number of tool and die makers who have left firm's employment in the past year is _____; of these: _____ retired; _____ left labour force or emigrated, and _____ were seeking or obtained work with other firms.

c On average, it took _____ days/weeks/months to hire tool and die makers.

d The most successful means of recruiting were (ranked from #1):

newspaper advertising	_____	immigration authorities	_____
community college	_____	sign at gate	_____
through friends or relatives		union (name)	_____
of staff	_____	unsolicited applications	_____
private employment agency	_____	Canada Employment Centre	_____
other (please indicate)	_____		

4. TURNOVER OF APPRENTICES

a The number of apprentices taken on in past year? _____

b The number who left the firm's employment in the past year ? _____

c The main reason they left was _____

5. CONSEQUENCES OF THIS SHORTAGE

The most important consequence of the shortage of tool and die makers in the past four or five years were:

	MOST IMPORTANT CONSEQUENCES	
	Initial	Subsequent
increase in overtime by existing staff	_____	_____
increase in wages above other occupations	_____	_____
increase in number of persons being trained	_____	_____
transfer of persons from other skills or occupations (e.g., machinists)	_____	_____
more efficient use of existing tool and die makers	_____	_____
recruiting outside Canada	_____	_____
subcontracting of work to other firms	_____	_____
reduction in production (or a smaller increase in production than had intended)	_____	_____
introduction of machinery to alter methods	_____	_____

other (please specify) _____

6. Does the firm estimate further requirements for:

a Journeymen? Yes ____ No ____ How many years ahead? _____

Are these needs indicated to community colleges? Yes ____ No _____

b Apprentices? Yes ____ No ____ How many years ahead? _____

Are these needs indicated to community colleges? Yes ____ No _____

ACTIONS TO REMEDY THE SHORTAGES

7. Suggestions to remedy the shortage (e.g., are you thinking of introducing on apprenticeship program?):

_____

8. A number of alternatives have been raised for dealing with the shortages including: indenture, antipirating laws, an education levy, and a required ratios of apprentices. Do you have any comments on these or other alternatives?

_____

9. Between 1931 and 1941, Ontario added over 3300 tool and die makers, more than doubling the number in the province without immigration. Do you have any information on how this occurred?

_____

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